ORIGINAL ARTICLES.

SOME OF THE CAUSES OF PULMONARY CONSUMPTION VIEWED FROM A DARWINIAN STANDPOINT.[1]

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THE most competent authority of the present day, Mr. Herbert Spencer, defines life as "a continuous adjustment of internal to external relations," and qualifying this he says that "the degree of life varies as the degree of correspondence between it and its environment." It is not necessary to illustrate the truthfulness of this definition to any great extent, for the development of muscle in the athlete's arm, the thickening of the epidermis on the laborer's hands, the callosity of the gums resulting from the loss of teeth, cardiac hypertrophy due to obstruction in the circulation, eyeless fishes inhabiting subterranean waters, the long-sighted countryman as compared with the near-sighted townsman : all attest the correctness of these observations.

While it is true that life as a whole depends on an adjustment of internal to external relations, it is also true that the same adjustment takes place between any part of life and its immediate surroundings. For if from any cause, either external or internal, the normal or ordinary course of an organ or of its function is enhanced, collateral changes supervene in neighboring organs. In the undue development of the athlete's arm it is not alone the muscular tissue which is implicated in the process, but the bones of the arm, especially the points of insertion for muscles, and every subjacent organ become enlarged. The hypertrophied textures demand a larger amount of nutritive material, and this in turn demands greater facilities for supplying the same, which implies not only more blood and larger bloodvessels in the part, but also a greater capacity of the heart and of the whole circulatory system.

The same delicate adjustment which exists between the eye and light, between the ear and sound, also exists between the lungs and the atmosphere ; indeed, the evolution hypothesis demonstrates that the many varied organs of the animal body are but the creatures of a differentiated environment. The respiratory organs pass through a certain well-defined process of evolution, and while it is true that in man the respiratory function is carried on with highly specialized organs, this is not the case throughout the animal world ; for in very lowly developed organisms respiration is performed by the cutaneous surface of the body, while in those of a somewhat higher type there appear special vascular spots in the skin which facilitate the exchange of gases. Then

as complexity of structure increases, the respiratory function of the skin is supplemented by a special respiratory apparatus which differentiates from the wall of the alimentary canal in the shape of an air bladder, and which in the higher vertebrates evolves into the highly complex respiratory organs. It must not be forgotten that even in the highest animals the lungs do not monopolize the function of respiration exclusively, for the human skin is capable of absorbing $\frac{1}{130}$th as much oxygen, and of eliminating $\frac{1}{130}$th as much carbonic acid as the lungs.

The lungs, therefore, are organs of absorption and of excretion, are intimately connected with the atmosphere on the one hand and the blood on the other, and are subject to the same law of development through exercise as are other organs. This is not only abundantly illustrated in those who expand their lungs through systematic training, but also in those who inhabit elevated regions. The Quichua Indians, who dwell on the lofty plateaus of Peru, are a good example of this. By constantly living in and respiring the rarefied atmosphere of this region their chests acquire enormous dimensions, and the air cells of their lungs become more numerous and capacious.

While physiological exercise strengthens an organ, disuse favors its impairment. This is supported by many clinical and physiological facts. Destruction of a nerve or of a bloodvessel leads to atrophy of all the dependent textures. "Reugger attributes the thin legs and thick arms of the Payaguas Indians to successive generations having passed nearly their whole lives in canoes with their lower extremities motionless. Other writers have come to a similar conclusion in analogous cases" (Darwin, *Descent of Man*, p. 32). In the high table lands of Peru there lives a tribe of Indians, which is closely allied to the Quichua tribe, the bodies of many of whom have been carefully measured by Dr. Forbes, with the result of showing that, as in the case of the Quichua Indians, their chests are developed out of all proportion to the rest of their bodies ; and he, moreover, states that the people are so thoroughly acclimated to their cold and elevated abodes "that when formerly carried down by the Spaniards to the low eastern plains, and when now tempted down by high wages to the gold-washings, they suffer a frightful rate of mortality" (Darwin's *Descent of Man*, p. 35). Nevertheless, Dr. Forbes found a few families on the low lands who had survived for several generations, but the increased size of the thorax so characteristic of their progenitors on the high elevations had materially decreased, although they still showed some enlargement.

What is the probable condition of a lung or a part of a lung suffering from the effects of disuse? This can only be conjectured, for we have no exact data on which to base a reliable opinion. We have com-

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[1] Read before the Philadelphia County Medical Society, November 10, 1886.

plete knowledge, however, of acquired atelectasy—a condition of complete collapse of a portion of lung owing to occlusion of the bronchus leading to it, and this gives us a picture, at least, of what is possible under such circumstances. In the acquired form of atelectasy the pulmonary capillaries, differing from the congenital form, are profusely developed already, and when the atmosphere is cut off the alveolar structure of the lung collapses, the elastic fibres of the framework contract and so form a mechanical barrier to the pulmonary circulation. The blood-flow, therefore, becomes sluggish, the blood accumulates, and the part becomes hyperæmic and gives to that portion of the pleural surface a dark, flesh-colored tint.

We have no evidence for believing that mere disuse of any portion of lung structure is followed by such decided pathological changes as those outlined in the last paragraph, yet there can be no doubt that something akin to it must necessarily develop where the expansion of a portion of lung is habitually at fault. Such a lung is practically partially deprived of air, and, therefore, in a state of semi-collapse and hyperæmia, and more vulnerable to disease than its more active neighboring parts. This observation is very applicable here when we reflect that on account of a peculiar downward direction of the bronchial tubes there is an unequal rate of expansion of the lungs. The base and middle portions always expand before the apices, and the latter only expand fully toward the end of a deep inspiration. We see, therefore, that, owing to their inactivity, the apices offer the strongest inducements for the lodgement of disease there, and it is precisely these territories which are notoriously liable to pulmonary consumption.

Now, whatever belief we may entertain concerning the origin of the human species, there can be no doubt that the progenitors of the present civilized race were at one time in a state of savagery, and that the gulf which separates the civilized man from the savage of to-day is no smaller than that which exists between the latter and the anthropoid ape. During the period of man's development the process of adjustment between internal and external relations has wrought such a complete revolution in his existence that his habits and customs, his civil and his social and intellectual interests are diametrically opposed to those of his savage ancestry. When we come to inquire into the causes which have brought about this difference between the savage and the civilized man, we find that, so far as his physical well-being is concerned, they consist principally in a change of occupation, of shelter, and of clothing. The occupation of the savage consists of hunting and fishing, while that of his civilized neighbor comprises the complicated industries and the varied agencies which have been evolved and accumulated during thirty centuries of intellectual development; the shelter of the savage is a rude hut, or the canopy of heaven, while that of the modern man is that of magnificent dwellings and palaces; and the clothing of the former is reduced to a minimum, while the body of the latter is covered and embellished with the most elaborate dress.

The question around which centres the greatest interest for us at present is whether the higher development of civilized man has in all respects resulted advantageously; or rather, whether the adjustment of his internal to his external relations is beneficial to his respiratory organs. This can unhesitatingly be answered in the negative. There is no reason for believing that civilized man requires less air for breathing purposes than his savage brother, yet by spending more than half of his lifetime in poorly ventilated dwellings, there can be no doubt that the former receives much less than the necessaries of his life demand. Especially does this observation become pregnant with meaning when it is linked with the facts that the lungs in improved breeds of cattle, which naturally take little exercise and are domiciled much of their time, "are found to be considerably reduced in size when compared with those possessed by animals having perfect liberty" (Darwin, *Animals and Plants*, vol. ii. p. 361), and that the vital lung capacity is smallest in persons who lead sedentary lives, such as professional men, students, clerks, etc., and the greatest in those who follow an outdoor occupation, such as sailors, recruits, etc. It is also true that the vital lung capacity of non-singers is less than that of singers (Waldenburg).

Then again, when we reflect that civilization consigns the great majority of its members to occupations which are carried on indoors, and which in many instances are of a sedentary character, where, besides breathing a vitiated atmosphere, the free expansion of the chest is hampered by a bent and cramped position of the body, it does not require a very vivid imagination to realize that the respiratory organs soon begin to suffer from the consequences of disuse and fall a prey to that pathological condition which was pictured in the early part of this paper.

These deductions are amply confirmed by the statistics which have been obtained concerning the influence of occupation as a causative factor in pulmonary consumption. In the report of the Brompton Hospital for Consumption, in London, for the year 1849, a number of tabular views are given, one of which is here presented (copied from Ancell' *Treatise on Tuberculosis*, pp. 497, 498):

Dr. Ancell (*loc. cit.*, p. 501) states that from other statistics we are enabled to draw the following conclusions: That in Paris, Geneva, Vienna, and Hamburg there are a greater number of persons leading a sedentary life afflicted with consumption than of those leading an active life, in the proportion of 141 to 89; and that a bent posture appears to augment the frequency of the development of phthisis.

An exchange of outdoor life for one of confinement frequently leads to pulmonary consumption, as is attested by the following facts: Animals transported from both warm and cold climates to the menageries and zoölogical gardens of our great cities persistently die of pulmonary consumption. The natives of the East show but little liability to the disease in their own climate, but when serving as soldiers in Ceylon and China, where they are confined in barracks, they become exceedingly susceptible to it. The negroes are comparatively free from it in

TABLE XXIII.—SHOWING THE TRADES AND OCCUPATIONS OF 4358 PATIENTS LABORING UNDER PHTHISIS TREATED AS IN- AND OUT-PATIENTS, FROM SEPTEMBER, 1842, TO DECEMBER 31, 1848.

MALES—Total, 2682.

Indoor.		Outdoor.		Mixed.	
Clerks, warehouse-men, and shopmen	314	Laborers of various kinds	490	Carpenters	120
Mechanics	270	Coachmen and cabmen	109	Painters and glaziers	73
Servants	237	Butchers	15		
Tailors	192	Various occupations	184		
Shoemakers	127				
Printers and compositors	104				
Weavers and glovers	22				
Bakers	45				
Various	146				
No occupation, or under 15 years	234				
Total	1691	Total	798	Total	193

FEMALES—Total, 1597.

Indoor.		Outdoor.		Mixed.	
Servants, or persons engaged in indoor occupations	836	None.	.....	None.	
Milliners, dressmakers, needle-women, and straw-bonnet makers	312				
Laundresses	10				
No occupation, or under 15 years	439				
Total	1597				

their native climate, but when transported to foreign countries, especially as slaves or prisoners of war, the mortality from consumption is frightful among them.

The natives of Van Dieman's Land furnish an appropriate illustration of the effects of a sudden change of environment on the human constitution. These savages in their native state had the reputation of being free from pulmonary consumption before the advent of the white race. But Ancell (*loc. cit.*), to whom we are indebted for many interesting facts, says that, according to Dr. Power, on account of their frequent depredations the white settlers confined them on an island in Bass's Straits and furnished them with

"provisions, clothing, dwelling places, and proper superintendents. But to a wandering race accustomed to rove at will through a large and extensive country, to procure their food, as they pleased, by hunting and fishing, and, regardless of dress, to live where and how they liked, this confinement to a narrow little island, and immediate change of their own free and unfettered habits to the more constrained and artificial ones of civilized life, proved speedily fatal. They died in great numbers, and the majority from pulmonary consumption."

"It is probable," quoting from the same authority (p. 542), "that one-fourth of the Europeans who migrate to the East Indies are hereditarily affected with the tuberculous predisposition, and yet a very small proportion indeed fall into active tuberculosis, or die of any form of the disease. The disease being also comparatively infrequent among the inhabitants, it becomes a great question whether the qualities of the climate, or the modified habits of the inhabitants and of emigrants, have most to do with this exemption. The circumstances of air, etc., of Europeans in London, and in Calcutta or Bombay, contrast greatly. The comparatively small and close rooms, the mode of heating apartments in England, the imperfection of ventilation in towns, streets, and houses, the great number of hours spent within doors, in close sleeping rooms, and in close carriages, present all the elements for the production of the disease here; while the more spacious apartments, and the outdoor habits, the habits of complete ventilation, and of almost constant exposure to the open air, are totally opposed to its production in the East; and where we find that the result of the withdrawal of these sanitary influences, even in the East, is the production of the disease, as in the case of half-caste and natives, and in the interior of jails, it becomes probable even here that the climate may have but a secondary importance in reference to etiology. . . . In fact, the statistics lead to one general conclusion, viz., that as respects the etiology, the habits and customs of mankind ride over all climatic influences; that if the European inhabitants of Calcutta or Alexandria were to adopt the modes of life pursued in the metropolis of the British Empire (London), tuberculosis would, after a period, be as frequent in those localities as it is here; and conversely, if the inhabitants of the densely populated countries of Europe were to improve their habits and customs as to labor and rest, indoor and outdoor occupation, the size, construction, modes of ventilation and sites of their houses, streets, and towns, with other circumstances of hygiene, after a sufficient period had elapsed for hereditary influence to wear itself out, that they would probably be more free from this disease than the inhabitants of Lapland, Canada, Greenland, India, Egypt, or Ceylon."

We have thus far briefly considered the influence of occupation and shelter in their relation to man's pulmonary organs, and hope we have given proof to show that the baneful effects of a sedentary and cramped position of the body, of breathing a vitiated atmosphere, and of an impediment to free respiratory activity, incidental to the transition period from savage to civilized life, have so far modified these organs that in many instances man has been unfitted and unable to maintain a prolonged struggle in the battle for existence. It is evident, however, that in this process of elimination to which the human family is subjected, the weak will fall a prey to it first, and that the bad effects of adjustment may be sufficiently counterbalanced in the strong as well as in the weak to enable them to survive the operation; hence, in order to be able to counteract them by artificial means, it is of the greatest importance to inquire into the causes which create a tendency to weakness in this direction. Of all the causes there is probably none which is more potent to produce a predisposition of this kind than that of reproduction, and the remainder of this paper will be devoted to a discussion of a few of the more salient points of this process.

There can be no doubt that there is a direct an-

tagonism between nutrition and reproduction, for "reproduction is a form of nutrition and a growth of the organism to a size beyond that belonging to it as an individual, so that a part is thus elevated into a new whole" (Haeckel, *Generelle Morphologie*, vol. ii. p. 16). Herbert Spencer, in writing of the antagonism existing between growth and sexual genesis, says: "Whether a deduction is made from one parent or from two, whether it is made from any part of the body indifferently, or from a specialized part, or whether it is made directly or indirectly, it remains in any case a deduction, and in proportion as it is great or frequent or both, it must restrain the increase of the individual (*Principles of Biology*, vol. ii. p. 428). From these principles it follows that reproduction is most perfect when growth is completed and before bodily decay sets in; that the higher the rate of nutrition during the reproductive period the higher the rate of reproduction; and that if the bodily expenditure is greater for other purposes than for reproduction there is a corresponding deduction from the resources which would otherwise be devoted to the maintenance of the latter process. In other words, offspring will be, if other things are equal, most vigorous when the growth of both parents is complete and the state of nutrition good; and least vigorous and most prone to decadence when the state of nutrition of the parents is low, when their expenditure for other purposes is great, or when reproduction takes place rapidly or follows at short intervals, or takes place before the body is fully developed, or during the period of bodily decline. All other things being equal then, the last or the youngest children, as well as those who are born before the bodies of the parents are fully developed, should be the weakest, and those born during the remainder of the reproductive period should be the strongest.

We have before us a most interesting work[1] (to which we are very much indebted for many of the ideas suggested in this paper on the relation between reproduction and pulmonary consumption) on the etiology of pulmonary consumption, in which are related the histories of five hundred cases of pulmonary phthisis—giving the age of the patient, the number of children in patient's parents' family, order of patient's birth, number of children in grandfather's family, father's side; also, in that on the mother's side, and, in many instances, the order of birth of both father and mother. We have taken the liberty of analyzing four hundred of these cases, in order that their conspicuous bearings will be more readily perceived, and, also, for the purpose of showing to what extent they verify the above deductions on the relation between reproduction and pulmonary consumption. The results of this analysis are as follows:

The first one hundred cases are patients who come from numerous families, average size of each, 9.87, and whose fathers and mothers came from rather small-sized families, averaging 4.96 and 4.69 respectively, and who were free from every trace of phthisis. About seventy-five per cent. of the patients are the youngest, or belong to the youngest members of their families, none of the older ones being affected.

The second one hundred cases are patients who come from rather small families, the average size of which was 5.52. Their fathers and mothers were healthy, and without a taint of phthisis, but all came from large families, averaging 7.72 and 7.18, respectively, and about seventy five per cent. of them were the youngest members, while very few belonged to the oldest or even the older members of their respective families. Thus, in fifty-four instances, so far as the statistics show, was the father the youngest, and in twenty-four instances the second youngest; thus seventy-eight per cent. were the youngest and second youngest, while there were no oldest, third or fourth oldest, and only one second and one fifth oldest among them. On the mother's side, in fifty-seven instances she was the youngest, and in eleven instances the second youngest, while there was no mother among the second, third, fourth or fifth oldest, but four were the oldest members of their families. In three of the last four instances, however, she was the only child. The patients themselves are principally the products of the beginning and of the termination of the reproductive period, especially of the former, while those of the middle period are comparatively exempt. Thus, of the whole number, twenty-nine are the oldest, and twenty are the youngest of their families.

The third one hundred cases can be considered most conveniently in two sections of fifty cases each. These are cases which occurred in families the parents and grandparents of which were healthy, and in most instances became aged; but the children, who are the patients, manifested a scrofulous tendency in youth. The first fifty cases occurred in families, the children of which were rather numerous, averaging 9.48 per family, whose fathers and mothers came from medium sized familes, averaging 6.54 and 6.86 per family respectively. More than two-thirds of these patients belong to the youngest or younger members of their families, while the older remain almost entirely unaffected. These cases are analogous to the first one hundred cases just related. The second fifty cases occurred among families, the children of which were less numerous than those of the first fifty cases, averaging only 6.70 per family. The fathers came from families of rather larger size than were the families of the first fifty, averaging 7.76 per family; while the mothers came from families of the same average size as those of the first fifty cases (6.86 per family). The patients, like those of the second one hundred cases, came principally from the oldest and the youngest members of their families, especially from those of the former, while those coming from the middle of the reproductive period remained comparatively free.

The fourth one hundred cases are patients, either of whose parents or some of their near relatives suffered from pulmonary phthisis. They are children of small families the average size of which was 5.96; but both their fathers and mothers belonged to large families, these averaging 8.78 and 6.04 respectively.

[1] Die Aetiologie der Chronischen Lungenschwindsucht, von Dr. Hermann Brehmer, sen. Berlin, 1885.

Here again the victims belong chiefly to the two extremes of the reproductive period, and the products of the intermediate period are comparatively free, although less free than in any of the previous sets of cases.

The analysis of these four hundred cases, among other things, shows very clearly—

1. That not all the members of large families are equally vigorous and alike resistant to pulmonary consumption, and that, as a whole, they are less vigorous than those of smaller families.

2. That the youngest members of numerous families, provided their parents are healthy and come from small families, are most liable to pulmonary consumption. This is illustrated in the first one hundred, and in the first fifty of the third one hundred cases.

3. That both the youngest and the oldest members of small families are liable to pulmonary consumption, while the intermediate members are less susceptible to it, even though the parents and grandparents were healthy and became aged; provided, that either or both parents come from the youngest members of numerous families. This is well demonstrated by the second one hundred, and the second fifty of the third one hundred cases.

4. That children born of parents having phthisical antecedents are subject to the same law of liability as those children whose parents are healthy but come from the youngest of numerous families, with the exception that it is not necessary for one or both parents to come from the youngest of their families. This is clearly shown by the fourth one hundred cases.

5. That those children who are born within a year after the birth of the preceding members are more liable to pulmonary consumption than those who are born two or three years apart.

6. That children born of phthisical parents are liable to pulmonary consumption three years earlier on the average than those born of healthy parents. This is shown by contrasting the average age of the patients of the first one hundred cases with that of the fourth one hundred cases.

7. That parents with a family history of consumption are less prolific by nearly one-half than those who are healthy. This is shown by comparing the average number of children in the patient's families of the first one hundred cases with those of the fourth one hundred cases.

8. That, given a patient coming from a numerous family, of which the parents came from medium-sized or small but healthy families, we can predict that the patient is the, or one of the, youngest of the family; or, given a patient coming from a small family, of which the parents came from numerous families, and were among the youngest but healthy, we can predict that the patient either belongs to the youngest or the oldest, and not to the intermediate ones of his family; or again, given a patient coming from a small family, of which the parents came from a numerous family, but who have a phthisical history, we can predict that the patient belongs to either the older or the younger members, provided the patient's parents are not the youngest of their families; if they are the youngest, then the intermediate members are not exempt, although even then more so than those of either extreme.

In concluding this interesting subject, I hope that sufficient evidence has been brought forward to show that the environment of the modern man, so far as his shelter and occupation are concerned, is directly opposed to that of his savage progenitor; and hence through the operation of the law of adjustment of internal to external relations, his respiratory organs have been so changed as to predispose them to pulmonary consumption. I have also endeavored to show that, under certain conditions, the process of reproduction has the power of decreasing the vital resistance of the individual organism, and thus prepares it for the evolution of the same disease. Converging, therefore, both the external and the internal evidence as here given, we can, from this source alone, predict, with a great degree of certainty, which, from a certain number of individuals, are most prone to become a prey to the greatest scourge of modern civilization.

Note.—Since finishing this paper, I have collected a number of cases of phthisis coming under my own observation, accompanied by the necessary data, and all of them confirm the close relationship between reproduction and the liability to pulmonary consumption which seems to be so firmly established by the history of these four hundred cases. As soon as I have collected a sufficient number of such cases, I shall tabulate them for publication.

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AN ANALYSIS OF
FORTY-FIVE CASES OF DIPHTHERIA.

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As some medical magazines have recently contained articles asserting that sundry drugs or methods of treatment were certainly, or almost certainly, curative in diphtheria, I shall not apologize for laying before the numerous readers of THE MEDICAL NEWS, the result of an experience derived from observing forty-five cases of that grave disorder. I had at first no favorite drug or method of treatment, and while the results strongly indicate to my mind the advisability of the use of bichloride of mercury, I prefer that each physician, who chooses to read this paper, should draw his own conclusions from the data I shall furnish.

In February, 1884, an epidemic of diphtheria appeared near Fort Thomas, Arizona. It was reported on what seemed trustworthy authority that ninety or more persons had died of the epidemic within fifteen days, at a mining town not very far from Fort Thomas.

The disease gradually spread down the Valley of the Gila, and made its appearance at every settlement near that stream. The weather was warm, 70° to 90° F. at noon, and in the earlier part of the time during which the epidemic prevailed the sky was cloudless. The water supply wherever the disease appeared, was drawn from the Gila River or from shallow wells. The houses were of sun-dried

brick—adobes—small, poorly ventilated, and were usually roughly furnished within. The walls were porous, and the floors commonly of earth. The disease always progressed much more favorably when the patient's friends could be induced to allow the sick-room to be thoroughly ventilated. But among the Mexicans and most frontier people of a certain class there exists the greatest imaginable fear of air-draughts, and of taking cold. Commonly the authority of some old woman overbalanced the most stringent orders and pathetic appeals of the physician. The friends of the patient usually remained in his chamber. And as there were often as many as fifteen persons, including children, in a low-pitched room twelve by fourteen feet, with one small door and a microscopic window, there was no theoretical difficulty in accounting for the spread of the disease.

The first case which came under my observation was that of a Mexican boy, ten years of age. He was moribund when I saw him, and before my assistant could run two hundred yards to get the instruments necessary to perform tracheotomy, the boy died—thereby, no doubt, saving me from the opprobrium of performing a fatal operation. The patient's neck was swollen, the cervical and submaxillary glands hard and prominent. The diphtheritic membrane covered the fauces and lined the nasal cavity, extending over the upper lip where it had been excoriated by the discharge from the nostrils. The cause of death appeared to be asphyxia, and the operation of tracheotomy was in consequence believed to be indicated. No post-mortem examination was permitted in this or in any case.

Cases 2, 3, and 4 were children of a Mexican mother and an American father. The symptoms were the usual symptoms of diphtheria. The prostration in cases of half-breeds was always very considerable. These cases were treated by a local antiseptic application—wash and spray—a wash of lime water, and by the internal administration of this mixture.

R.—Potass. chlorate . . . . ʒj.
　　 Muriated tinct. of iron . . ʒij.
　　 Quinia sulph. . . . . gr. xv.
　　 Sodium hyposulphite . . . ʒj.
　　 Alcohol . . . . . ʒj.
　　 Water . . . . q. s. ʒvj.—M.
One or two teaspoonfuls were given three times a day.

I found this prescription in an article by Dr. F. Peyre Porcher, and it did me yeoman's service. Dr. Porcher said he believed this mixture possessed the virtues of a prophylactic against diphtheria, but requested that those who used it for this purpose should report their success or failure. I regret to be compelled to state that in no case was any individual saved from an attack of diphtheria by taking this mixture, provided he remained in the room or house in which there was a case. The remedy was thoroughly tried in at least twenty cases, but proved of no value as a prophylactic. After the development of the disease the remedy seemed to me to be of very great value.

Of these three cases, 2, 3, and 4, 2 and 4 recov-

ered while 3, who seemed least ill of all, died suddenly. A Mexican girl, aged ten, also died suddenly. These two fatal cases appeared to die from failure of the heart's action due to paralysis.

Case 10 was that of a frail girl, eight years of age. Her throat was much swollen, and the fauces were choked with membrane, which exhaled a horrible stench. She died within twenty-four hours after the disease declared itself. Lime water, applications of various antiseptics, full doses of Porcher's mixture and of stimulants were used in vain in this case.

Case 11 was that of a robust girl of six years. She received the same treatment which Case 10 received, and likewise died. Case 12 was the younger brother of the girl mentioned as Case 10, and when seen was equally as ill as she. He received one-sixty-second of a grain of corrosive sublimate, and began to improve after taking the first dose. He made a good recovery. Cases 14, 15 16, 17, 18, 19, and 20 occurred in the same family. Here the prophylactic effect of Dr. Porcher's prescription was *nil*. Bichloride of mercury was used internally and locally from the beginning of the disease in all of these cases. All made good recoveries. Cases 21, 22, 23, and 24 occurred in one family in spite of the persistent use of Dr. Porcher's prescription. Bichloride of mercury was used internally in these cases, and all recovered. One suffered from paralysis of accommodation for some months. Cases 25 to 31 inclusive recovered under the internal administration of the bichloride of mercury, but two of these cases suffered from paralysis of accommodation. Case 32 was a robust soldier. As the case was a mild one, Porcher's prescription alone was used. The patient recovered, but twelve months later was suffering from paralysis of the soft palate, which appeared a few days after he began to suffer from diphtheria. His voice had a muffled nasal sound, and when he attempted to swallow liquids, they would regurgitate through the nose.

Case 33 recovered under the bichloride treatment with temporary paralysis of the lower limb. Case 34, under the same treatment, recovered with paralysis of accommodation. Cases 35 to 45 inclusive, were treated with bichloride of mercury internally, and all made good recoveries, with three cases of temporary accommodation-paralysis (one accompanied by paralysis of the soft palate), and one of temporary partial paralysis of the lower limb accompanied by formication. In one of these cases, acute gastritis was set up by the bichloride of mercury.

The following table exhibits the results of the treatments.

Thirty-three cases treated by bichloride of mercury gave no deaths, but 12 paralyses, not one of which was permanent. All of these cases of paralysis were among children. The 11 cases treated by other remedies gave 4 deaths and 1 permanent paralysis. The case of permanent paralysis was the case of a man aged twenty-six years.

In considering the number of cases successfully treated by the bichloride of mercury, it is well to bear in mind that these cases occurred later in the epidemic than those treated by other methods.

No. of case.	Sex.	Age.	Condition when seen.	Treatment.	Result.	Sequelæ.
1	Male.	10 years.	Moribund.	Nil.	Death.	
2	"	3 "	Not very ill.	Dr. Porcher's prescription, and antiseptics locally.	Cure.	
3	"	5 "	" " "	" " " "	Died suddenly.	
4	Female.	7 "	Very ill.	Same as Cases 2 and 3, and stimulants.	Cure.	
5	"	15 "	Not very ill.	Same as Cases 2 and 3.	Died suddenly.	
6	Male.	12 "	" " "	" " " "	Recovered.	
7	"	5 "	Very ill.	" " " "	"	
8	"	10 "	Not very ill.	" " " "	"	
9	Female.	6 "	" " "	" " " "	"	
10	"	8 "	Very ill.	Same and stimulants.	Died.	
11	"	6 "	Not very ill,	" " "	"	
12	Male.	6 "	Very ill.	Bichloride of mercury.	Recovered.	
13	Female.	15 "	" "	" " "	"	Paralysis of accommodation.
14	"	6 "	Not very ill.	" " "	"	" " "
15	Male.	8 "	" " "	" " "	"	
16	"	12 "	" " "	" " "	"	
17	"	17 "	" " "	" " "	"	
18	"	20 "	Very ill.	" " "	"	
19	Female.	3 "	Not very ill.	" " "	"	
20	"	40 "	Very ill.	" " "	"	
21	"	4 "	" " "	" " "	"	
22	"	6 "	Not very ill.	" " "	"	Paralysis of accommodation.
23	"	12 "	" " "	" " "	"	
24	"	36 "	" " "	" " "	"	
25	"	20 "	" " "	" " "	"	
26	Male.	6 "	" " "	" " "	"	
27	"	8 "	Very ill.	" " "	"	
28	"	28 "	Not very ill.	" " "	"	
29	Female.	10 "	" " "	" " "	"	Paralysis of accommodation.
30	"	8 "	Very ill.	" " "	"	Paralysis of accommodation.
31	Male.	14 "	Not very ill.	" " "	"	Paralysis of accommodation.
32	"	26 "	" " "	Dr. Porcher's prescription,	"	Paralysis of soft palate.
33	"	13 "	" " "	Bichloride of mercury.	"	Paralysis of legs.
34	Female.	13 "	Very ill.	" " "	"	Paralysis of accommodation.
35	Male.	1 "	Not very ill.	" " "	"	
36	Female.	8 "	Very ill.	" " "	"	Paralysis of lower limbs, nervousness, and formication.
37	Male.	6 "	Not very ill.	" " "	"	Paralysis of accommodation and of soft palate; and
38	Female.	4 "	Very ill.	" " "	"	Acute gastritis due to poisoning by bichloride of mercury.
39	"	18 "	Not very ill.	" " "	"	
40	"	15 "	Very ill.	" " "	"	Paralysis of accommodation.
41	"	12 "	Not very ill.	" " "	"	
42	Male.	8 "	" " "	" " "	"	Paralysis of accommodation.
43	"	6 "	" " "	" " "	"	
44	"	28 "	" " "	" " "	"	
45	"	32 "	" " "	" " "	"	

Some of these, however, were as severe when first seen as any from Cases 2 to 11 inclusive. Case 38 was as ill as any patient I have seen recover.

The success attending the use of bichloride of mercury would have led me to believe that many of the cases treated with this drug were cases of pharyngitis, if paralysis had not frequently occurred.

The diphtheritic membrane usually began to come away in from two to four hours after the administration of the bichloride of mercury. The dose varied from one-twenty-fourth to one-sixty-second of a grain, according to age and effect.

COLUMBUS BARRACKS, OHIO, September 16, 1886.

BELLADONNA POISONING.

BY J. H. BRADSHAW, M.D.,
OF ORANGE, N. J.

WE not infrequently hear of very large doses of medicine being taken by mistake, and a toxic effect, naturally expected, failing to ensue. It is quite common to ascribe this fortunate failure of symptoms of poisoning to put in their appearance to the diminished strength of the drug taken. I have heard of a teaspoonful of tincture of aconite being taken by a small child, without giving any alarm to the family. The case I am about to report can hardly be classed as one in which dangerous symptoms failed to appear because of a poor preparation of drug used, as the one taken was the normal liquid of belladonna leaf (Parke, Davis & Co.).

A patient, a young lady to whom I had given a mixture containing belladonna for asthma with good results, came to my office, stating that her medicine had been lost, and that she desired a new prescription. This I gave her, and, as she was unable to have it filled at the drug-store that night, and was suffering from her complaint, I handed her about two drachms of the normal liquid of belladonna, telling her to take five drops in water before going to bed. As she had been accustomed to take her other medicine in teaspoonful doses, she disregarded

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the new directions, and, upon retiring, took an overflowing teaspoonful of the drug. The dose was taken at ten o'clock. Soon after eleven, the mother of the patient was awakened by the labored breathing of her daughter, and becoming instantly alarmed at her pallid appearance, summoned her physician. I arrived about two hours after the drug had been taken. There had been no vomiting, and when I reached the room the patient was standing in the middle of the bed, highly delirious, swaying from side to side, respiration difficult, and sobbing, heart beating about 120 to the minute, and the radial pulse extremely feeble. A small rim of iris surrounding an extremely dilated pupil instantly gave the diagnosis. Although a sufficient period of time had elapsed since the dosage for most of its absorption, still my first efforts were made in causing emesis. Unfortunately, I had no access to apomorphine, and had to resort to such agents as mustard and yellow sulphate of mercury, by the mouth. After struggling with the patient for a long time in vain attempts to make her swallow, efforts of this kind were abandoned, and a half grain of morphine was given hypodermatically.

I have struggled with the delirium of fevers, and with the delirium of tremorous drunkards, but I never before met a patient so violent as was this poor girl. I remained with her the remainder of the night, and repeated the morphine in quarter grain hypodermatic doses; I do not now recall exactly how many, probably *half a dozen*. The morphine acted beneficially almost from the first, and the patient, toward morning, went into a slumber, respirations falling to ten per minute about five o'clock.

The next day the patient dressed herself, and spent the greater portion of it upon a sofa, and in a few days was as well as ever. It is interesting to add that for about six months the patient had no attack from her asthma.

MEDICAL PROGRESS.

ACUTE PNEUMONIA IN UTERO.—DR. HENRY STRACHAN writes to the *British Medical Journal* of November 6, 1886:

I am not aware whether the following case is the first recorded. I have been unable to find any account of a similar one, but whether that be so or not, it seems to me of great interest, and worthy of being placed on record,

A patient, Nancy M., was admitted into the hospital under my care in December last, suffering from acute pneumonia (whole of left lung), and a history of illness covering the four days previous to admission. She was eight months pregnant. On the evening of the day of admission, her temperature was 103.6° Fahr., and she was delivered of a female infant. The infant died in less than twenty-four hours after birth, with symptoms of acute pneumonia. A post-mortem examination showed acute pneumonic consolidation of the whole of the left lung. The mother made a rapid and good recovery.

Whilst there is ample evidence that the other acute specific diseases (so-called "fevers") are capable of being transmitted by the pregnant woman to her off-spring yet *in utero*, this is the first time I have had any evidence that the "acute pneumonic fever" could also be so transmitted.

GALVANOPUNCTURE IN GYNECOLOGY.—APOSTOLI has formulated the following practical rules in regard to the employment of galvanopuncture in gynecological practice :

1. In the treatment of either the uterine parenchyma or of the periuterine cellular tissue, great care should be exercised that the peritoneum be not implicated in the puncture.

2. Facilities for the elimination of the products of suppuration should be maintained, in order to avoid injection, and to permit of local antiseptic treatment.

3. Short punctures, of one to two centimetres (five to ten lines), are always preferable to those of greater depth.

4. The bladder should always be carefully sounded in all directions, in order to avoid its implication.

5. In all cases of lateral or posterior puncture, the localities of arterial pulsation should be determined by digital examination, and the perforation of the larger vessels carefully avoided.

6. Enforced rest in bed, of from one to several days, is demanded of all patients thus treated.

7. Before and after each puncture, an antiseptic vaginal injection is given, and a tampon of iodoform gauze is to be retained in the vagina until the complete cicatrization of the orifice of the puncture is effected.

8. All sexual approach is prohibited until the cure is complete.—*L'Union Médicale*, Oct. 19, 1886.

CANTHARIDES IN THE BITES OF RABID ANIMALS.—DR. KARCHEVSKI mentions in the *Russkaya Meditsina* that he has successfully treated some patients who had been bitten by a rabid wolf with cantharides. The wolf attacked three men, inflicting on the first a large and deep wound in the left groin, a piece of skin several square inches in area being torn off. The other men were wounded in the face, legs, and arms, but more superficially. Still the bites of a rabid wolf are well known to be peculiarly dangerous. Dr. Karchevski remembered a conversation he had had with Professor Lashkevich, in which the latter had suggested cantharides as a remedy in hydrophobia, and he therefore made up his mind to give it a trial. Cantharides plasters were applied to all the wounds, and powdered cantharides was administered to each of the three patients in doses of a grain a day. The internal administration was continued for a week, until the patients complained of some heat in the urethra. Seven months having passed, and all the patients being still perfectly healthy, the author thinks the case worth recording, though he is quite aware that *post hoc* is not necessarily in this instance *propter hoc.*—*Brit. Med. Journ.*, Nov. 6, 1886.

ANTI-DIARRHŒIC PILLS.—TROUSSEAU recommends the following formula in rebellious cases of diarrhœa which have resisted treatment by salines :

R.—Powdered ipecac. . . . gr. viij.
　　Extract of opium,
　　Calomel . . . āā gr. iss.
To make twenty pills.

The dose, one to three pills daily, is continued for a week or longer.—*L'Union Médicale*, Oct. 24, 1886.

SATURDAY, NOVEMBER 27, 1886.

THE INOCULATION OF TUBERCULOSIS BY OPERATIONS FOR ITS RELIEF.

UNTIL very recently it seemed as if the indications for operation upon tuberculous foci in the bones and joints had been clearly laid down, and the propriety and usefulness of such operations had been fully established. But in the Thirteenth Congress of German Surgeons, KÖNIG called attention to the possibility of surgical interference hastening the death of a patient by becoming the means of inoculation of the specific virus, or specific germ, of tuberculosis, thus leading to the rapid development of acute miliary tuberculosis.

At the last Congress VOLKMANN also recognized and admitted this possibility, but no systematic and complete presentation of the relative frequency of such an unfortunate issue to operations intended to be strictly conservative had as yet been presented. The first attempt in this direction has been recently made by WARTMANN, of St. Gallen, who, at the suggestion of Feurer, has used the material of the latter's service in the hospital at St. Gallen, as a basis for an elaborate study of the relation of operations upon tuberculous joints to subsequent outbreaks of general tuberculosis. To this material Wartmann has added an analysis of all the reliable reports bearing upon the matter which were accessible to him, and has embodied the results of his work in an admirable paper published in the *Deutsche Zeitschrift für Chirurgie*, Bd. xxiv. Hefte 5 und 6, 1886.

In this paper Wartmann restricts himself to a study of the relation of resections to the outbreak of acute miliary tuberculosis. He gives a detailed account of the history of 74 cases in which Feurer performed such operations for tuberculous disease of the joints. Of these, 1 was done at the shoulder-joint, 10 at the elbow-joint, 3 at the wrist-joint, 18 at the hip-joint, 38 at the knee-joint, and 4 at the ankle-joint. In the whole series there were eleven deaths while the patients were under observation, and one followed five months after a resection of the elbow-joint, the patient having pronounced lung disease at the time of the operation. Two followed resection of the wrist-joint; one occurred three months after the operation in a miserable patient with lung disease at the time of the operation; and one occurred ten months after the operation in a patient who had a number of tuberculous foci so old that they could not be attributed to inoculation by the operation. Four deaths followed resection of the hip-joint; one from acute carbolic acid poisoning; three from chronic tuberculosis at periods of two years, one year, and nine months, respectively, after the operation; and one died in seven days after the operation with fresh miliary tubercles in the lungs and small caseous foci in the pericardium, besides tubercles elsewhere. This case, Wartmann thinks, may have been one of inoculation at the time of operation. We cannot admit as much without question, since the patient had before the operation a large abscess above Poupart's ligament, and after the operation vomiting on the second day, with evidence in the urine of carbolic acid poisoning. There can be little doubt that the operation hastened the patient's death; but we think it very questionable if the fresh tubercles in the lungs, or the recent pleurisy with bloody effusion ought to be attributed to inoculation at the seat of the wound. May not the inoculation have arisen from the caseous foci in the pericardium under the influence of the vomiting and the depression of carbolic acid poisoning?

Hartmann records, further, two deaths after resection of the knee-joint. One of these occurred five months later from erysipelas attacking a fistula, which remained after the operation. The other death occurred three and a half months after the operation, in a thin and feeble girl, who had no other evidence of general tuberculosis at the time of the operation. At the time of death the patient had cavities in both lungs and tuberculous ulcers in the bowels. This case Wartmann properly excludes from his list of acute tuberculosis due to inoculation, although he thinks that some bacilli may have found their way to the lungs and bowels in this way. After resection of the ankle-joint, one death is here recorded. The patient was a well-nourished boy, four years old, with slight enlargement of the glands of the neck and of the groin of the affected side. About three weeks after the operation the patient had an attack of pleuro-pneumonia, from which he

recovered. Three and a half months after the operation symptoms of basal meningitis appeared, and the lad died two weeks later, having tubercles in the pia mater and in one lung. Wartmann classes this case with the one of death after resection of the hip-joint, mentioned above, as being possibly instances of inoculation from the wound. But we may say of this case what we have said of the other, that we cannot admit as much as Wartmann does in regard to it. Both cases are open to the same objection which we urged in THE MEDICAL NEWS of April 3, 1886, in regard to two cases of so-called inoculation of wounds with tuberculosis, reported by Kraske in November, 1885.

Wartmann adds to the statistics of the hospital at St. Gallen 763 cases of resection of joints for tuberculous disease, collected from other sources, with 214 deaths, and of these 24 were due to acute miliary tuberculosis. This makes a total of 837 cases, with 225 deaths, of which 26 may be attributed to infection from the operation wound. Wartmann does not venture to generalize much upon these figures, but he very sensibly suggests the collection of the statistics of a large number of cases treated without operation, with which to institute a comparison.

We may go a little further than does the author, and point out the relative infrequency of even a presumable inoculation by operation. Only about one-tenth of all the deaths are attributed to this cause, and only a little more than three per cent. of the whole number of patients can be supposed to have lost their lives by this accident. When to this we add the fact that König, in his *Die Tuberculose der Knochen und Gelenke*, 1884, reports only about sixteen cases in which infection followed operation, among the many thousand cases treated in the hospital at Göttingen, and that Volkmann and Ollier, with their very large experience, have observed it so rarely that it has not until recently attracted their special attention, we cannot but conclude that while the subject is eminently worthy of serious and careful study, the danger of setting up general tuberculosis is not a formidable objection to operation for the relief of tuberculous disease of the bones and joints.

In conclusion, we would call attention to one of the most interesting points in connection with Wartmann's paper, namely, the evidence it furnishes that the limitations of a comparatively small hospital offer no insuperable obstacle to valuable work. Careful study of a few cases under personal observation, joined with an examination of what has been published by others in regard to similar ones, will enable even the most modest worker to add—as Wartmann has added—a worthy contribution to the common fund of surgical knowledge.

BRIGHT'S DISEASE AND APOPLEXY.

THE condition of the arteries is an index of a man's age. He is old or young, the prospects of life are bad or good as these vessels are hard or soft, stiff or elastic. The circulatory apparatus is nothing more than an elaborate system of supply tubes with the heart as a central pumping station, and the kidneys as waste pipes of elaborate and peculiar construction. So close in health is the functional relation of these three parts—heart, arteries, and kidneys—that we almost naturally expect to find them associated together in disease.

Although the broad clinical and anatomical fact of the close connection of certain chronic forms of renal disease with cardio-vascular changes is universally recognized, yet the precise mode of relationship is still under discussion. Unquestionably in a majority of cases the renal trouble is primary, while the changes in the heart and vessels are secondary to it. But there are instances in which the chronic nephritis seems a sequence of the arterial disease. It has been for years a matter of common observation that a large proportion of all cases of hemorrhage into the brain were in persons with arterial degeneration and kidney disease of the form known as interstitial nephritis. This is essentially a slow, progressive malady, insidious to a degree, creeping on from year to year, producing, perhaps, but few symptoms, and in too many instances the patient, without warning, is seized with serious illness which may prove quickly fatal.

The cardio-vascular changes which this form of Bright's disease brings with it are of the utmost importance with reference to apoplexy, one of the most common events in this condition. The tension of the blood in the arteries is increased, and the pulse is felt to be hard and incompressible. The existence of this so-called renal pulse may give a cautious physician the first clew to the nature of the trouble. The vessel walls also become harder and less elastic, the condition described by Gull and Sutton as arterio-capillary fibrosis. The arteries of the brain are very prone to participate in this change. Lastly, the heart hypertrophies and supplies a force capable of maintaining sufficient pressure in the diminished capillaries of the kidneys to furnish the full quota of urine; with variations in the frequency with which certain symptoms, such as œdema, occur, these are the essential features in the history of most cases of chronic interstitial nephritis.

The recent death from apoplexy of an eminent citizen, who had for some time been the subject of this form of renal disease, illustrates forcibly one of its most formidable dangers. We have gradually come to regard the disease as a very chronic malady, lasting for years, and with which the individual, if careful, may enjoy a fair measure of health, and

even do active work, but if once fully established, there are risks of accidents, of which cerebral hemorrhage is the most serious.

On the occasion of the death of Vice-President Hendricks we called attention to the intense wear and tear of political and business life in this generation as tending to induce arterial disease, and the same is an important factor in the increasing prevalence of chronic Bright's disease. That this increase is in the business and professional classes of the community rather than among the workingmen, is an opinion held by men of wide experience.

SPERMATORRHŒA IN GONORRHŒA.

The occurrence of a genuine spermatorrhœa, that is to say, an involuntary discharge of semen without erection or orgasm, is rare. Still, it is known to take place often enough to merit attention; and there can be no doubt that it sometimes occurs without producing any subjective effects sufficient to attract the attention of the patient, so that only accident or rare detective ability on the part of the physician leads to its discovery. Whether or not it is to the advantage of the patient that such unfelt losses of seminal fluid should be known to him or to his physician, cannot as yet be positively asserted. There are those who feel sure that such losses are injurious, others are not so clear on this point. Among the former is Fürbringer, of Berlin, who has for some years made a special study of the conditions in which spermatorrhœa may take place, and who has published a paper on this subject in the *Deutsche medicinische Wochenschrift*, No. 42, 1886.

In studying the causation of spermatorrhœa Fürbringer finds that a previous attack of gonorrhœa is the cause of spermatorrhœa in the majority of cases, as compared with true neurasthenic spermatorrhœa. He has been able to determine this fact for himself by a careful examination, during four and a half years past, of the urine of patients under treatment for chronic gonorrhœa. In making his examinations he has been careful to exclude cases in which the presence of a small quantity of semen could be attributed to natural coitus, or nocturnal emissions, or the practice of onanism in the correct sense of the word, or of masturbation, as well as those cases in which straining at stool, or in any other way has forced out a little semen from the vesicles. Excluding all such cases, Fürbringer has found in one hundred and forty cases of chronic gonorrhœa, no less than twenty-five patients with what he calls "latent spermatorrhœa"—that is, with the presence of a few spermatozoa in the urine, totally unsuspected by themselves. Fürbringer's investigations seem to indicate that in the spermatorrhœa of gonorrhœal origin the discharge is not mixed with the secretion of the prostate, is devoid of the characteristic odor

of the seminal fluid, and contains no Böttscher's crystals, while all of these are present in cases of neurasthenic spermatorrhœa.

Fürbringer explains the pathological process and mechanism of this form of spermatorrhœa as follows: By the effect of a chronic inflammation of the deep urethra, the ejaculatory duct becomes insufficient, and thereafter the intraäbdominal pressure caused by straining at stool, or in passing water, or in any other way, causes expression of the contents of the seminal vesicles without the participation of the prostate in this act. Fortunately, according to the observations of Fürbringer, this form of spermatorrhœa is not prejudicial to the power of coitus, or of begetting children.

These observations and opinions of Fürbringer are of decided interest, and it is quite possible that the systematic examination of the urine of patients who have chronic gonorrhœa may throw a light upon the processes of spermatorrhœa which will be of the greatest value in understanding this disorder.

The President on November 18, appointed Lieutenant-Colonel John Moore, Assistant Medical Purveyor, to be Surgeon-General of the Army. Dr. Moore is a native of Indiana, and entered the service as Assistant Surgeon in June, 1863, and after doing duty in Florida and in the Utah Expedition of 1857, he was ordered in 1861 to the Marine Hospital at Cincinnati. In June, 1862, he was promoted to be Surgeon, and was assigned to duty as Medical Director of the Central Grand Division of the Army of the Potomac. In May, 1863, he was transferred to the West, and was appointed Medical Director of the Department and served with the Army of the Tennessee at the close of the siege of Vicksburg. He served through the campaign ending in the capture of Atlanta. He accompanied General Sherman's grand army on the famous march to the sea and through the Carolinas.

Subsequent to the war he served as Medical Director of the Department of Mississippi; was on duty in New York as member of the Army Medical Examining Board. He was Medical Director of the department of Texas and of the Columbia. He was promoted Assistant Medical Purveyor, with the rank of Lieutenant-Colonel, October 8, 1883, which rank he now holds, and is stationed in San Francisco, Cal. He was brevetted Lieutenant-Colonel for gallant and meritorious services in the Atlanta campaign, and Colonel for faithful and meritorious services during the war.

It has been stated that Dr. Moore was not an applicant for the Surgeon-Generalship, but that his excellent record and proved executive ability have probably commended him to the favorable notice of the President. He can hold the office for four years

before he will be eligible for retirement on age.   He has been ordered to report at Washington at once.

DR. BERNAYS, of St. Louis, last week, successfully performed a gastrotomy upon a tailor aged forty, for the extraction of an ordinary silver-plated dinner knife 9½ inches long, which he had swallowed in imitation of the juggler's feat.

THERE came, accidentally, into our possession, a short time ago, a memorandum, signed by the late Joseph Pancoast, relating to a remarkable injury received by the late James P. White, the well-known gynecologist of Buffalo.   The note was as follows: "A front segment of the atlas vertebra, a little more than an inch on the superior margin, a little less below, with the facette which received the odontoid process.   It was in the possession of Professor Granville S. Pattison, to whom it was loaned by Dr. White, to show Professors Joseph Pancoast and McClellan.   It is probable that the transverse ligament retained its hold on the two extremities of the remaining fragment of the atlas, thus protecting the spinal marrow from injury.   This bone in possession of Professor Pattison I repeatedly saw, and carefully examined; he exhibited it to his class, and it was mislaid or lost.   At the request of Professor White, I make this statement of facts.   This bone was in our possession in 1838–39–40, or thereabout.   I then understood and believed (since confirmed by conversation with Professor White), that it came from his throat, coming out through the mouth as a consequence of ulceration; the result of an accident while riding in a stage-coach on the morning of December 17, 1837.   The bone was discharged at the expiration of forty-five days after receipt of the injury."

This statement, signed "Joseph Pancoast," records an interesting and remarkable accident which, so far as we know, has not been made public, and of which there are only one or two instances mentioned in literature.

SOCIETY PROCEEDINGS.

PHILADELPHIA COUNTY MEDICAL SOCIETY.

Stated Meeting, November 10, 1886.

I. MINIS HAYS, M.D., IN THE CHAIR.

DR. THOMAS J. MAYS read a paper on

SOME OF THE CAUSES OF PULMONARY CONSUMPTION VIEWED FROM A DARWINIAN STANDPOINT.

(See page 589.)

DR. J. C. WILSON thought that we must hesitate to accept fully the conclusions which the author draws from his studies.   He has used, in speaking of this subject, the three terms, pulmonary tuberculosis, pulmonary consumption, and phthisis, interchangeably.   He has

called attention very carefully to the well accepted views that indoor occupations, bad ventilation, etc., are predisposing causes of this group of affections, but he certainly fails to establish the fact that they are exciting causes.

With reference to the second part of the paper, it is also true that influences which unfavorably affect the offspring, are rather predisposing than exciting causes of the disease.   The time has scarcely come when we can satisfactorily discuss this subject.   We are now passing through a transition period with reference to the etiology of pulmonary phthisis.   He was one among those who regard pulmonary consumption in its ordinary form as a chronic infectious disease.   With this view of the subject, the conditions spoken of by the author could only be regarded as predisposing influences.

DR. J. H. MUSSER said that there is no doubt that a want of correspondence of the body to its environment leads to such a condition of the system as predisposes to phthisis.   He is a profound believer, however, in the specific origin, and in the infectious nature of tuberculosis.   He cannot explain the occurrence of cases of phthisis simply by the surroundings of the individual. There are on record instances of locations which, for a long period of time, have been free from tuberculosis; in fact, it never occurred there until, from source of infection, one or two cases have arisen, and from these the disease has spread, so as to become almost epidemic. Under such circumstances, there must have been some distinct specific agent.   Again, a person whose family history is good, one who has lived largely an outdoor life, a person of fine physique, surrounded by the most favorable environment, may develop a severe form of tuberculosis.   In such a case, the cause is direct contagion.   There is another line of thought which is brought out by this paper, and that is with reference, plainly speaking, to breeding.   The intermarriage of races, of kinship, of individuals of various diathetic vices, undoubtedly produces individuals that are predisposed to phthisis.   When we are as careful as the stock-breeder about the purity of strain, then we will get fine men, and that anatomical condition which predisposes to phthisis will be effaced.   He has seen the statement made that pulmonary consumption is rare in the pure negro and in the pure Indian, even when their surroundings have been changed, as compared with the negro or Indian with mixed blood.   With regard to tuberculosis in animals in a state of confinement, the question of possible contagion must be considered.   Who can tell but that the cages or places in which they are confined are reeking with bacilli.   Unless contagion is completely excluded, he thinks that we are not warranted in stating that these animals develop tuberculosis as a result of the change in their environment.

DR. HARRISON ALLEN said that a Darwinian study must rest upon a morphological basis.   Darwin gave great attention to the subject of variations.   It is not necessary that variations should be found in a normal state of the body; they may be of the abnormal state as well.   It is a matter in dispute as to the significance of variations.   Darwin inclined to look upon the majority of them as signs of progressive change.   There is no doubt that many of them are retrogressive.   Virchow claims that all variations are pathological.   The speaker expressed a wish that Dr. Mays had developed his theme

more into the direction indicated. Clinical medicine should rest firmly upon anatomy. In pursuing a research to ascertain the etiology of disease, the student can take no step (if he follow the methods of Darwin) which is not guided by the tenets of morphology. Dr. Formad has admirably defined the morphological basis of tuberculosis. He did not mention the fact that the cause of the left side of the thorax being slighter than the right is due to the circumstance that the left lung is smaller and weaker than is the right. Its lobes are fewer in number, and it lacks a bronchus in advance of the pulmonary artery. Here is found the essential reason why the left lung is so commonly involved. But to secure this fact, the entire mammalian series had to be investigated. This has been done by Aeby. May it not be surmised that gross variations of the arteries, as well as of other structures of the body might be found if they were sought for? Beneke determined the essential condition in rickets to be a preternatural increase of diameter of all the arteries. Virchow obtained an opposite result in chlorosis. It may be said, in an axiomatic way, that a well-defined clinical condition will be always found to rest upon an equally well-defined group of structural peculiarities.

DR. S. S. COHEN said that the mobile chemistry of the organism favors decay as well as repair, and it is only under favorable circumstances that development can proceed to its greatest perfection. The most trying period in the life history of cell, individual or species, is that in which it is adjusting itself to its changed surroundings. He was not sufficiently expert in mycology to determine the true relation between the bacteria and the disease to which they are supposed to give rise, but he can certainly conceive, as held by Dr. Mays, that in the transition from savagery to civilization, and in the readjustment of organism to environment, such conditions could arise as would lead to the development of phthisis without the presence of any infectious or specific principle whatever. We know that organs atrophy from disuse, and there is no reason why the cellular elements of the lungs should be subjected to any other laws than those which govern living cells in general. He might add to illustrations cited by the lecturer, the fact that the majority of retired pugilists die of pulmonary consumption.

DR. E. T. BRUEN said that one of the interesting points suggested by this paper, is the important bearing which a study of the predisposing influences has upon the proper management of cases of phthisis. We undoubtedly have the anatomical conditions which have been mentioned, and which, of course, cannot be removed, but by appropriate gymnastics the chest may be brought to resemble more closely the ideal chest. Again, the study of the relation of crowd poisoning to conditions interfering with respiration is a very practical point. As long ago as the time of MacCormac, the danger of pre-breathed air was recognized. Purity of the atmosphere is one of the prime conditions of a climate favorable to cases of phthisis. It has been shown that in elevated altitudes, when factories have been established, and the condition of the inhabitants is similar to that of those living in cities, phthisis is rife. Under such circumstances the disease is more frequent than it is in the plains, where crowding does not exist. If the process of nutrition can be brought to such a point that

the waste will be more than counter-balanced, much will be accomplished in the way of bringing about the arrest of the disease, and causing a so-called cure. The reason that we cannot do more, is that we have so many anatomical conditions against us.

DR. T. MAYS said that he purposely abstained from giving a definition of the terms to which reference had been made, but had included under the head of pulmonary consumption all the different forms, both tubercular and non-tubercular. Since confessions were in order, he too had one to make, for he experienced a change of view in regard to this question; for when the discovery of the bacillus tuberculosis was announced by Koch, he hoped that it would be a lever by which we could combat the disease. After a thorough study of this subject, both from a theoretical and practical standpoint, he was convinced that the bacillus is not the causative agent, and hence of no therapeutic importance. In regard to the anatomical peculiarities which have been mentioned, he had considered this matter, and concluded that they might possibly be considered as results. There are no investigations of which he is aware that show the shape and size of the respiratory and circulatory organs in persons before they became the subjects of this affection, and until this is done, comparative speculation is useless.

He did not recall having heard of an instance similar to that related by Dr. Musser, where the disease has become epidemic in a locality where it had not before existed. If this were proven, it would be important testimony against the origin of the disease in the manner which he had described. Dr. Musser also stated that the pure Indian is less liable to consumption than the Indian with mixed blood. Yesterday he received from Dr. Given, of the Carlisle Indian School, a letter in regard to this point. He stated that the Indian with mixed blood is less liable to phthisis than the full-blooded Indian, and this fact substantiates the theory of the development of consumption which he had advocated in his paper this evening.

NEW YORK STATE MEDICAL ASSOCIATION.

Third Annual Meeting, held in New York on November 16, 17, and 18, 1886.

THE third annual meeting of this Association was opened in Lyric Hall by the President, DR. E. M. MOORE, of Rochester. The scientific interest of the meeting centred around the special discussion which had been arranged on the subjects of gunshot wounds of the intestines and on eclampsia,

DR. WM. S. TREMAINE, of Erie County, opened

THE DISCUSSION ON GUNSHOT WOUNDS OF THE INTESTINES.

He said that the chief thought that occurred in connection with them is their marked fatality. The universal opinion being that a perforating gunshot wound of the intestines permitting extravasation into the peritoneum is hopelessly fatal, consequently, until quite recently the attention of surgeons was chiefly directed, in their treatment, to some form of euthanasia—and were surgery a non-progressive art, if its recent magnificent triumphs offered no hope for the future, he might well end here and be without excuse to pro-

pound certain questions for consideration. Happily there is hope. The impunity with which in these latter times the abdominal cavity has been opened and extensive surgical manipulations carried on therein gives reasonable ground for hope, that the " do-nothing system " will generally be abandoned and that laparotomy, where there is reason to suspect that the intestines have been wounded, will become a legitimate and successful surgical procedure. And this, without further preamble, opens to our consideration the first question—What are the reasons which lead us to suspect or believe that the intestines have been wounded? Or, in other words, does a group of symptoms exist which would lead to an accurate diagnosis of perforation of the intestines by penetrating gunshot wounds of the abdomen?

In seeking for the answer to this question recourse must be had to the literature of the subject, and of this, by far the most comprehensive is contained in the *Surgical History of the War of the Rebellion*, in which are tabulated 653 wounds of the intestines with a mortality of 80.3 per cent.

But here the meagreness of details of symptoms of reported cases is very marked. In a very few recorded cases such symptoms as "vomiting, small pulse, extreme restlessness" are given. The wound of the intestine was either inferred from the direction of the wound or demonstrated by the autopsy.

Without quoting extracts, it is sufficient for the present purpose to say that faint light is thrown upon the subject in most of the standard text-books, and that so far as books go, but little positive information can be gained as regards accurate diagnosis.

A somewhat extensive experience of the speaker, in wounds of this class, in both military and civil practice, leads to the following conclusions: that the calibre of the ball, the proximity of the weapon, and the position of the wounds of entrance and exit have an important bearing. That as regards general symptoms, the existence of prolonged shock, a lowered temperature, a feeble pulse, great restlessness, marked anxiety of countenance, accompanied by tympanites and great pain, taken in connection with the anatomical location of the wound, afford very strong evidence of a perforating wound of the intestines. That the escape of blood from the anus rarely happens soon after the injury, and is consequently of little value as a diagnostic sign.

Given a case of penetrating wound of the abdomen by a rifle or pistol bullet of from 32 to 45 calibre, fired at ordinary range, accompanied by the above mentioned general symptoms, the probability in at least nine cases out of ten would be death. Does the surgical art offer any plan of treatment by which this fearful rate of mortality may be lowered? In searching amidst the recorded thoughts of master minds in surgery, one finds this question often propounded, and occasionally the answer hinted at with more or less positiveness.

It is a subject for congratulation to us, that the most practical contributions to the answer are largely of American origin. Our own Gross, in 1843, wrote an *Experimental and Critical Inquiry into the Nature and Treatment of Wounds of the Intestines*, in which he makes the following statement: "It will not do for the surgeon to fold his arms and look upon the scene as an idle and disinterested spectator. Far otherwise; he has a duty to perform, and that duty consists in dilating the external wound, if it be not already sufficiently large, in hooking up the injured bowel, and inclosing the solution of continuity with the requisite number of stitches, at the same time that the effused matter is carefully removed with tepid water and a soft sponge. All wiping must, of course, be carefully avoided, as this would add much to the risk of peritonitis."

The question was debated by some of the older surgeons, and in 1836 Baudens advocated the enlargement of the wound and the application of the suture, and reports two cases of enterorrhaphy. Guthrie, after speaking of the frightful mortality, says: "The ' do-nothing system ' is commonly followed by death. A well-regulated interference is likely to be more successful." In the Danish war, Lohmeyer advocated "a search for the opening, sew up the wounded knuckle, and to return the latter after removing effused fecal matter." In the Crimean war, similar views were advocated by Legouest. In our own war, these doctrines were carried out by Drs. Bentley, Judson, Gill, and Kinloch.

But in all this the question seems to be restricted to enlarging the wound, and in cases where the diagnosis of perforation was not doubtful, the method of making an incision in the linea alba seems not to have been considered. The propriety of closing by suture a perforation of the intestines is no longer debateable. The question before us is the propriety of incising the abdomen in the middle line: First, for diagnosis; second, to arrest hemorrhage; third, to sew up the wounds in the intestines, should any exist; and, fourth, to remove extravasated blood and fecal matter.

The knowledge gained by laparotomy for other troubles, such as abdominal tumors and the like, undoubtedly gave a great impetus in this direction; consequently, we find a great master in abdominal surgery, the late Dr. Marion Sims, uttering, in 1882, the following words: "I have the deepest conviction that there is not more danger of a man's dying of a gunshot or other wound of the peritoneal cavity properly treated, than there is of a woman's dying of an ovariotomy properly performed. Ovarian tumors were invariably fatal till McDowell demonstrated the manner of cure, which has now reached such perfection that we cure from ninety to ninety-seven per cent. of all cases, and by the application of the same rules that guard us in ovariotomy to the treatment of shot wounds penetrating the abdominal cavity, that there is every certainty of attaining the same success in these that we now boast of in ovariotomy." (*British Medical Journal*, March 4, 1882.) Let us hope that these bold words may prove, in a measure at least, truly prophetic.

I have stated laparotomy first, for purposes of diagnosticating; this is perhaps a debatable ground, for I take it that no surgeon would now question the propriety of exposing the abdominal cavity and suturing the wounds in the intestines, were such were known positively to exist, to do so, would be to abandon the case to inevitable death. Let us suppose a penetrating gunshot wound of the abdomen, where the indications are not clear that the intestines have been perforated (a point, by the way, almost always more or less in doubt).

Is it proper to incise in the middle line and explore? To this I answer, yes: First, because the intestines may be wounded; second, in any event, it is in nine times

out of ten required for the removal of effused blood. We have often in abdominal sections realized the difficulty of arresting hemorrhage from an exceedingly small vessel or oozing point. We are all familiar with the danger from effused blood allowed to remain in the cavity of the abdomen; third, the abdominal section adds but little, if any danger, when done under proper precautions, to which may be added, fourth, the assurance given to the patient that his intestines have not sustained a fatal wound, which cannot but have a marked tonic effect, conducive to recovery.

When the intestines are perforated there can be no longer any doubt as to the propriety of abdominal section, for just so certain as there is perforation, there will be fecal extravasation, and with this extravasation will follow peritonitis and death, providing the patient survive the immediate shock of the injury. Happily, the question of the advisability of the operation has been set at rest by at least three successful cases in America. It is doubtful if there is any well-authenticated case of recovery after a perforated gunshot wound of the small intestines with fecal extravasation, so no amount of negative evidence can weigh against the positive evidence of these successful cases of laparotomy with enterorrhaphy for perforating gunshot wounds of the small intestine. The first case, that of Bull, with perforations; the second, that of Hamilton, with eleven wounds; the third, that of Bull, with perforations.

But little remains for us to consider beyond the "when" and the "how," the "time," when laparotomy should be done, and the manner of doing it. I think there can be no question that the operation, having been determined on, should be done as soon as practicable after the receipt of the injury, for the following reasons: It is believed that the first effect of the injury is to paralyze temporarily the peristaltic action of the bowels, thus for a short time preventing fecal extravasation. It is obvious that moving the patient, if it does not overcome this, will tend to displace mechanically some of the contents of the intestines. Again, if intra-abdominal hemorrhage is going on, it will not be likely to stop spontaneously; moving the patient will not, it is certain, conduce to the arrest of hemorrhage, if it exists; delay increases the chances of peritonitis, thus bringing secondary troubles to add to the primary one, already grave enough.

The disadvantages of delay are well shown in a case reported by Dr. C. T. Parkes to the Chicago Medical Society, October 5, 1884, *Journal of the American Medical Association*, October 31, 1885, where the patient was removed to his home in a farmer's spring wagon a distance of seven miles, and the next day removed to the hospital. It may be also remarked that in this case section was not made in the median line, but the wound was enlarged. At the autopsy, commencing peritonitis and a quantity of extravasated blood were found; one wound had been overlooked. On the other hand, the advantages of immediate operation at the place where the shooting has occurred, and as soon as possible after the injury, are to a certain extent offset by the fact that the surroundings are liable to be unfavorable to abdominal section and that the average general practitioner is not sufficiently skilled in the surgical manipulations considered necessary to attain succes. It has been demonstrated

that success in abdominal surgery, other things being equal, increases with favorable surroundings and personal experience in the technique. If laparotomy in gunshot wounds is to become an established operation, it can scarcely be expected that an experienced surgeon can always be obtained, or that the appliances and trained assistance so earnestly insisted on as essential, in other departments of abdominal surgery will always be immediately available, this difficulty can of course be overcome. I would suggest that medical men may train themselves by practice on some of the lower animals. A few experiments will thoroughly convince anyone unfamiliar with this work of the necessity of just such training.

Wherever practicable, I believe the dangers of removal will be counterbalanced by placing the patient where the sanitary surroundings are good and where skilled assistance and necessary appliances can be had. So far, the successful cases have occurred in the hands of men exceptionally well trained for their work—men of superior surgical skill—and assisted by all the apparatus and advantages of well-appointed hospitals. The wounds were inflicted by pistol shots, bullets of medium calibre, viz., 32.

But what of the battlefield? Here it is obvious that by far the greater number of gunshot wounds occur. The modern rifle bullet, weighing 500 grains or more, at ordinary range must inflict a much more serious wound than the comparatively small pistol bullet of 22 and 32 calibre. Although the difficulties of immediate laparotomy under such circumstances may not in the future prove insurmountable, yet it must be confessed that, so far, they have not been met; the proceeding, if not positively detrimental, amid the smoke, dust, haste, confusion, and pressing demands upon the time of the military surgeon on the actual battlefield, will, at any rate, not be found easy of execution. So far as our present experience goes, it would seem the better practice to wait until the wounded man can be carefully removed to a division hospital, in the meantime occluding the external wound or wounds by some convenient form of antiseptic pad. The value and praticability of laparotomy with enterorrhaphy, in military practice, can only be satisfactorily determined by experience in future wars. There are many points to be considered that do not greatly concern the civil surgeon.

In regard to the method of operating, the general plan will follow that of ovariotomy, with the same rigid precautions to prevent sepsis. The method of dealing with the wounded intestine occupied the attention of the older surgeons from the time of the "four masters" who flourished in Paris in the latter part of the thirteenth century, and who used a section of the trachea of an animal. Others used metallic rings, or the ferrule plan as it was called. These were of course applied to incised wounds, or where exsection of portions of injured intestines had been made. The suture of Jobert, 1822, Lembert, 1826, Gely, 1827, each have their advocates, but the present accepted one seems to be that of Lembert or the Czerny-Lembert suture. It may be said of the latter that it is difficult of execution, and as expedition, without undue haste, is of great importance, that form of suture which is most easily applied and at the same time is effective in preventing escape of intestinal contents is best—experience and experiment have shown

that this is the suture of Lembert, the chief point being to bring together the peritoneal coat of the bowel.

It must be remembered that gunshot wounds are lacerated and contused, and before being sutured they must be converted into incised wounds, by carefully paring away the contused portions. Where the injury to the bowel is extensive, or several perforations are close together, this is not always practicable, without resection of the intestine. In this case certain precautions are necessary, the lumen of the intestines above and below the portion to be removed must be occluded with some form of clamp. Treves and Bishop have devised instruments for this purpose. I have found the ordinary spring clothespin, slightly altered, as it may be in a few minutes, to answer this purpose. I also suggest, as a precaution against the escape of blood and the contents of the intestines into the peritoneal cavity, that the portions of the intestines to be operated on should be drawn through an opening in a piece of thin India-rubber used by dentists, and known as rubber-dam.

As the bowel derives its blood supply from the mesentery, it is important, in order to prevent gangrene, that the mesenteric attachment should be as far as possible preserved. When necessary a **V**-shaped portion of the adjacent mesentery can be removed and this wound closed by the continuous catgut suture.

A question may here arise, "How much of the intestine can be removed with safety?" Baum removed 137 centimetres of the small intestine; the patient recovered from the operation, but six months afterward progressive emaciation resulted in death. This case would seem to indicate that there is a limit to the amount that can be removed without impairing the health.

Sir Spencer Wells suggests that hollow cylinders of cocoanut butter and gelatine be used to afford a support to the intestine and facilitate the passing of the sutures, when enterorrhaphy is necessary. The sutures may be of catgut or fine pure silk, and should be not less than one-tenth of inch apart. I prefer the needle known as Schnetter's, as there is no cutting edge—but ordinary round sewing needles will answer the purpose well. Very small wounds can be closed with the continued suture. All bleeding points must be carefully sought, and ligatured or cauterized. Careful attention must be given to the toilet of the peritoneum; a clean cavity is essential.

After-treatment. Rest, opium, a small quantity of phosphorized milk.

The following case occurring under my own care, while perhaps not strictly germane to the subject, is sufficiently so to warrant relation here. John B., aged eighteen, was admitted about 10 A.M., September 6, 1885, to the Emergency Hospital. At 12.30 A.M. of the same day, or about nine hours prior to admission, he had been stabbed in the abdomen. The wound was three and a half inches in length from the median line toward the right, and three inches below the umbilicus. It penetrated the abdominal cavity, and divided the rectus muscle together with the right deep epigastric artery. He was seen immediately after the injury by a physician, who placed three silver wire sutures through the skin only, and ordered one grain of opium to be given every hour, which was probably faithfully carried out, as on admission he was markedly under the influence of

opium, with contracted pupils, slow sighing respiration, cold surface, pulse 132. One of the stitches had given way; there was a bunch of intestine the size of a man's fist protruding through the wound in the muscular wall of the abdomen and distending the skin. After consultation with my colleagues of the staff of the Hospital, I made an incision in the median line, and removed about a pint and a half of clotted blood from the abdominal cavity, which was washed out with warm solution of bichloride of mercury 1 part to 3000 of water. The toilet of peritoneum was practised carefully as in ovariotomy, and with antiseptic precautions. As there was no bleeding, the peritoneum was sutured with fine catgut separately, and silver sutures passed through the skin and abdominal muscles, closing the original wound, and also the wound of operation, a rubber drainage tube left in the dependent angle of the incision, and over all an antiseptic dressing of wood flour prepared with bichloride of mercury and naphthalin (the usual dressing in use in the hospital), and the patient put to bed. He never rallied. At 5.30 P.M. he asked for a drink; at 10.30 P.M. pulse scarcely perceptible: at 11 P.M. he died. Before admission to the hospital he had probably taken (at least so it was stated) eight grains of opium. Had he been admitted to the hospital soon after the injury the result might have been different. It is difficult to say whether he died from the wound or from opium narcosis, or both combined.

The experiments of Dr. C. T. Parkes, of Chicago, as detailed in his valuable paper read before the American Medical Association, at its meeting in Washington, May, 1884 (see THE MEDICAL NEWS, May 17, 1884), are, in my opinion, of very great value in teaching many points in regard to the technique. I think they should be carefully studied by every practitioner of medicine.

DR. JOSEPH D. BRYANT, of New York, in reply to the question, *What are the diagnostic signs of involvement of the intestines in shot wounds of the abdomen?* said: It is presumed that the expression "diagnostic signs" is intended to be accepted as synonymous with "diagnostic symptoms," and also, that diagnostic signs or symptoms are considered to be those signs or symptoms which are characteristic of the abdominal state under consideration. The signs of intestinal involvement will be divided into two classes, viz.: 1. Those referable to the abdomen itself, or the local signs. 2. Those referable to the constitutional effects of the injury as the constitutional or general signs.

The *local signs* will be considered first, and will be arranged somewhat in the order in which they will naturally present themselves to the attention of the professional observer.

The wound of the abdominal wall is the leading local sign of primary interest, and the one most eagerly sought for by the medical attendant. The direction of the wound, the character of the discharge from the wound, and emphysema of its borders or of the neighboring connective tissues, are all of great importance in a diagnostic sense. If the course the missile has taken be such that it must have entered the peritoneal cavity, if undeviated, the presumption is strong that the contents of the cavity have been injured. Yet missiles of large size have passed through the peritoneal cavity, without being followed by symptoms of intestinal in-

volvement, and post-mortem examination of similar cases has failed even to show any evidence of the existence of an intestinal wound. However, instances like these are more illustrative of a freak of physical force, than of its inconstancy, and are, therefore, more curious than convincing. If blood flows from the wound of the abdominal wall and the wound be not in the course of the important bloodvessels of the structure, the hemorrhage is strongly suggestive of intra-abdominal bleeding and consequently of visceral involvement. If the bleeding points that are found in the wall of the abdomen do not account for the entire loss of blood, the evidence of intra-abdominal hemorrhage, dependent on intra-abdominal involvement, is conclusive. The passage of bloody stools, or bloody urine, at a near period to that of the receipt of the injury, will serve to confirm the belief that may exist of intra-abdominal visceral involvement. The escape of intestinal contents from the abdominal wound is positive proof of involvement of the intestine itself. This evidence is seen, however, very infrequently as an immediate sign, since the extravasated fluids are quite easily retained in the peritoneal cavity, owing to the change of the relations of the wound of the abdominal wall to those of the intestinal wound, caused by the intestinal vermicular motions, the natural movements of the patient, as well as those movements incident to the occurrence of the injury. The ragged borders of the abdominal wall interfere also as a notable obstacle to the escape of these fluids into the external world. Still, if the missile have caused large and gaping wounds of the soft parts, the intestinal contents will escape often at the time of the receipt of the injury especially if the intestine be plethoric with its characteristic matters, in spite of these circumstances. This sign appears somewhat late in the history of a case as a rule, and after the formation of inflammatory adhesions that guide the fluids along the adventitious channel formed by them, often from a considerable depth within the abdominal cavity. With this condition of things the intestinal contents escape readily through the abdominal wound, and alimentary substances may escape even quite as soon as swallowed.

Emphysema. This sign is not associated very frequently with penetrating wounds of the abdomen, but, when present, is almost invariably due to the escape of intestinal gases into the connective tissue situated between the intestine and the abdominal wall ; hence it is associated especially with injuries of those portions of the intestinal tract that are not surrounded entirely by peritoneum. Emphysema may be limited to the immediate neighborhood of the external wound or become general by spreading gradually from the seat of an intestinal wound into the surrounding connective tissue of the abdominal wall. It may be due also in part or entirely to a complicating wound of the pulmonary tissues. Early emphysema of the abdominal wall has been considered by some writers as a certain sign of intestinal perforation, when associated with a suspected penetrating abdominal wound. This statement, while commonly true, must be accepted as yet with a certain degree of caution, since it has happened that a circumscribed subcutaneous emphysema has taken place around nonpenetrating stab wounds of the abdominal wall, in two distinct cases within the observation of the writer. This emphysema was caused apparently by the suction influence exerted on the external air by the retraction of the divided fibres of the abdominal muscle, its escape being prevented by the valvular arrangement of the structure at the opening through the integument and subcutaneous tissues. Air in the peritoneal cavity may give rise to emphysema if it be forced between the structures bordering upon an abdominal wound into the connective tissues beyond this point. If decomposition occur in the course of a penetrating wound of the abdomen, emphysema of the contiguous connective tissue may ensue, even though the intestines themselves have not been injured. In such a case as this, the emphysema takes place at a later period than in the former case and is attended by the symptoms peculiar to decomposition and usually without the acute signs of intestinal penetration. Pain, tenderness, tympanites, bloody stools, and retention of urine are signs of common occurrence with intestinal involvement. The pain is located primarily about the seat of the wound, it is dull or lancinating at first and is increased by all muscular movements of the patient; later it becomes more intense and of a burning character, accompanied by exquisite abdominal tenderness, retraction of the thighs, and obstinate constipation. Not infrequently griping pains are present attended with frequent desire to stool. Retention of urine ; frequent calls to micturition which may or may not be successful, are of common occurrence in both the early and late history of intestinal involvement.

Tympanites. Tympanites may depend either on gaseous distention of the intestine, or the pressure of intestinal gases in the peritoneal cavity ; on extensive emphysema of the abdominal wall or on a combination of these factors. If tympanites develop soon after pain and tenderness appear, and increase in proportion with them, being at the outset best marked at and around the site of the wound, it is certain to be due chiefly to intestinal distention. If tympanites follow quickly, antedating the symptoms of inflammation, or be out of proportion to them, or if much distention of the abdomen with a drum-like sound attended by little or limited pain and tenderness be present, the tympanites depends without doubt on the presence of air in the peritoneal cavity. The substitution of tympanitic resonance for normal hepatic dulness may be considered a strongly diagnostic sign of even a small amount of air in the peritoneal cavity : but it may be caused by the adhesions of the intestine to the anterior abdominal wall in this situation, by a distended colon pressing firmly against the under surface of the liver, and by distention of the colon accompanied by a diminished area of hepatic dulness due to a contracted liver. In the former of the last two conditions, however, the area of hepatic dulness will be increased posteriorly by the pressing upward of the liver, providing the lung of that side be not emphysematous. In the later of these two conditions the posterior area of hepatic dulness will be lessened in proportion to the diminution of the size of the liver. Prof. E. G. Janeway has noted that the transverse colon may pass between the liver and the abdominal wall, causing tympanitic resonance in this situation. This condition has since been observed post-mortem by Dr. H. M. Biggs. If the serous surface of the liver be adherent to the anterior abdominal wall, hepatic dulness will be present even though air be in the peri-

toneal cavity. The foregoing marked conditions are so infrequent, however, that tympanitic resonance in the hepatic region, existing in a case of suspected intestinal involvement, may be considered almost pathognomonic of the existence of that condition. *Percussion of the abdominal wall* may elicit an abnormal line of dulness due to fluids in the peritoneal cavity. This line will be parallel with the long axis of the body and be influenced by its position. However, the amount of blood or of other fluid necessary to cause this sign must be considerable, especially if the pelvic pouches of the peritoneum have first become filled with it.

Palpation may detect a doughy feeling of the wall of the abdomen, which is imparted to it by the large amount of extravasated blood in the peritoneal cavity.

The constitutional or *general symptoms* that have a recognized bearing on the diagnosis of intestinal involvement are shock, nausea, vomiting, and hiccough. Shock is the first of the series of constitutional symptoms. It may be mild or severe, and while its gravity may depend either on the degree or on the idiosyncrasy of the patient, yet severe shock at the outset may be considered as almost diagnostic of a profuse hemorrhage or an extensive visceral involvement. Intense thirst, constant wakefulness, excessive restlessness, and great anxiety are manifestations of intestinal involvement, all of which are associated more or less intimately with shock, and the first of these with the initial processes of a consequent peritoneal inflammation.

Nausea commonly appears immediately after the intestinal involvement has taken place, vomiting also occurs at intervals and usually both nausea and vomiting are present subsequently during the entire course of a fatal case. Hiccough usually follows both nausea and vomiting, but is often controlled by the anodyne treatment addressed to the patient. There are many other signs of a primary and secondary character that are to be found in connection with the earlier or later history of a penetrating abdominal wound complicated with intestinal involvement. They are too well known already to require a recapitulation at this time, and moreover they are of a secondary importance, since they are of little practical use for the diagnosis of intestinal involvement, when considered independently of the sequelæ that so constantly follow it. It is now to be seen that there are very few positive early indications of intestinal involvement associated with an abdominal penetrating wound. The escape of the intestinal contents from the abdominal wound is a positive one; the presence of extravasated air in the peritoneal cavity, as indicated by modification of the area of hepatic dulness, is a positive sign of the involvement of the intestines or stomach, provided the area of hepatic dulness has not been modified already by abnormalities of position or morbid processes. It should not be forgotten, however, that intestinal involvement may exist without the presence of any or at least of a sufficient amount of extravasated intestinal gases in the peritoneal cavity, to modify appreciably the area of hepatic dulness.

The escape of blood from the peritoneal cavity through the abdominal wound is positive proof of intra-abdominal involvement, but which of the structures is involved must be largely a matter of speculation.

Hemorrhage from the bowel or from the bladder, other things being equal, should be accepted as conclusive proof of intra-abdominal involvement.

Percussion, as an aid in the diagnosis of ascitic fluid in the abdominal cavity, is of the utmost importance, especially if the line of dulness may be varied by changing the position of the patient. But when this sign is sought for in connection with the diagnosis of extravasated blood in the peritoneal cavity, which blood may be mixed, possibly with intestinal matters, or urine, its importance as a diagnostic sign is greatly overshadowed by the dangers arising from the dissemination of the irritating agents through the peritoneal cavity. Surely, the surgeon who would change the osition of the patient, and await the slow gravitation of the fluid contents of the peritoneal cavity to its most dependent part, that he might define a line of dulness by percussion, will expose the peritoneum to the danger of irreparable injury. This sign can be of but little practical use when properly sought, because when it is found without a change of the patient's position, the loss of blood will have been so great that other signs will have betrayed its occurrence already.

Palpation, when cautiously employed, can develop no facts in connection with extravasation that will possess a decisive influence in determining the question of intestinal involvement in an ordinarily obscure case.

Indeed, it would be far better for patients and for surgery, if the diagnostic importance of both percussion and palpation, in this instance, be not recognized at all in these injuries, than that the evidence to be gained by them be incautiously sought for by the surgeon. The severe constitutional symptoms already mentioned can be looked upon with that foreboding which is almost akin to certainty. The minor secondary symptoms also are not to be ignored; but are to be employed as connecting fibres in the diagnostic fabric.

DR. WILLIAM T. BULL considered *under what circumstances, and how soon after the injury, should laparotomy be resorted to in shot wounds of intestine; and when is the operation indicated?*

It is admitted by surgeons generally, that shot wounds of the intestine are almost uniformly fatal injuries. Even balls of the smallest calibre used in civil life, a "22" for instance, which have made only one or two wounds of the intestine, have brought about fatal peritonitis, and the instances of recovery have been very exceptional, and at he expense of dangerous peritonitis. It has furthermore been demonstrated that operative interference can deal with these injuries successfully. Three recoveries after laparotomy have been reported; one by Dr. Hamilton (*New York Medical Journal*, Nov. 14, 1885), and two by myself (THE MEDICAL NEWS, Nov. 6, 1886). And the unsuccessful operations have revealed the existence of injuries which would certainly have proved fatal without surgical assistance. It may, therefore, be considered settled that laparotomy is the best treatment for shot wounds of the intestine, and that it is generally indicated.

In applying this general indication to the individual case, we are beset with difficulties. It is often impossible to ascertain by the usual exploration with probes, whether a wound of the parietes be penetrating or not; and even when the intestine has been perforated, positive symptoms of that injury are often wanting at the

outset. Again, if laparotomy be delayed till the symptoms have made the diagnosis, it will be undertaken with very much diminished chances of success.

It is not my province to discuss the value of symptoms which indicate wound of the intestine; that has been undertaken by others. In cases which present these symptoms the indication is clear and imperative, and no surgeon should hesitate to give his patient the chance of operation if the general condition be such as to permit it.

But what I wish to emphasize, as bearing on the application of laparotomy, is the fact that many cases present few or none of these symptoms; that the sudden onset of peritonitis is the first indication of intestinal wound; and, again, that a bullet which has entered the abdominal cavity in the region occupied by intestine is much more likely to have injured the gut than to have missed it. Experiment has shown the possibility of avoiding the gut in the cadaver, but clinical evidence is lacking to support it. If we can be sure that a bullet has entered the peritoneal cavity, we may safely assume that it has injured the intestine or other viscera, and any doubt will be dispelled by the presence of feces, fecal swelling, gas, much blood, or serous exudation. There is but one way to ascertain these conditions at the outset, and that is by exploration of the bullet wound. And this should be done at the earliest possible moment, when the immediate shock of injury or transportation has subsided, and proper arrangements for operation have been made. I need not dwell long on the necessity of an early operation. Delay gives an opportunity for renewed bleeding and fecal extravasation, and invites septicæmia from the absorption of peritoneal exudations. If peritonitis be actually developed with tympanites, firm adhesions, and purulent foci, the difficulties of operation are almost insuperable, and the chances of success extremely doubtful. This plan of procedure which I have advocated and already put into practice, will, in my opinion, prove safer in the aggregate of cases than the policy of waiting for symptoms, inasmuch as exploration, conducted with antiseptic precautions, must be regarded as of trifling risk to the patient. It is not without advantage in a non-penetrating wound. It will enable the surgeon to remove the bullet, explore the wound in the most favorable condition for rapid healing, and reassure the patient.

A penetrating wound enlarged to two or three inches in length, will permit the inspection of the viscera in the neighborhood, and the examination of other parts with a sponge or the finger. In the further exploration of the viscera, section in the middle line is preferable. As a general rule, I believe it will be safer in the aggregate of cases to perform laparotomy when the wound is found to be penetrating, even if the cavity be tolerably clean. But it is worthy of note, that in none of the cases hitherto reported has there been any lack of blood or bloody serum in the cavity. In two instances when the abdomen was opened, only two hours after the injury, there was an abundant exudation of serum of blood clots.

Let me present, in support of this treatment, the result in eight cases observed at the Chambers Street Hospital since 1877. These are all the cases in which the nature and extent of the wounds were determined by autopsy or operation and in which, with but one exception, the intestine alone was involved.

1. The whole number of wounds in 10 years is 20. 5 were of the parietes only; 7 were of the intestines alone; 1 was of the intestine and bladder; 1 was of the stomach, and 1 was of the stomach and liver; 2 were of the liver alone; 3 were not examined after death. They were presumably 1 of the intestines alone, 1 of the intestines and kidney, 1 of the liver and intestines. The five wounds of the parietes recovered. All the others died except the two intestinal cases, which were subjected to operation.

The number is small but the contrast is striking. Five cases of shot wound treated on the expectant plan have all proved fatal. Three cases in which laparotomy was performed after exploration of the bullet wound have yielded two recoveries and one death. The two successful cases have already been reported. *Case 1.* (MED. NEWS of Feb. 14, 1885): William McE. was operated on November 2, 1884, seventeen hours after the bullet of 32-calibre had entered the abdomen an inch and a half to the left and an equal distance below the umbilicus. Seven wounds of the intestines (from one of which the bullet was removed) were sutured and the cavity cleared of clots and bloody serum. The intestines were not adherent, though "coated here and there with clots and flakes of fibrin," so that in order to inspect their surface it was necessary to rub the peritoneum lightly with a sponge. The operation lasted two hours. The wound healed by granulation. I have seen the man within a few weeks; he remains in good health, working as a truckster.

Case 2. (MED. NEWS of Nov. 6, 1886): Daniel M., aged twenty-five, was operated on August 12, 1886, only two hours after he had been shot with a 38-calibre pistol-ball two inches below the umbilicus and two inches to the left of the median line. There were no symptoms of shock and no evidence of intra-abdominal injury. The incision into the bullet wound showed that it entered the cavity and bloody serum escaped freely. Three wounds of the intestine were sutured, and two wounds of the sigmoid mesocolon left gaping after being dusted with iodoform. From one of these wounds there was free hemorrhage which was controlled by ligature; and a large blood extravasation in its vicinity made it probable that the bullet was looped there. It was not interfered with. This moved normally on the fifth day, but complete recovery was delayed till eight weeks, owing to suppuration in the line of abdominal incision and the protrusion of a knuckle of intestine which was reduced by gradual pressure while its wound cicatrized over it.

Case 3, which proved fatal, I will mention more in detail, since it is reported for the first time.

On November 6, 1886, a muscular mechanic, of intemperate habits, twenty-four years of age, was shot in the back ten minutes before admission to hospital. The bullet, of 44-calibre, entered one and a half inches to the right of the spine on a level with the last rib and could be felt anteriorly beneath the skin one and a half inches to the right and two inches above the umbilicus. Pulse 62; resp. 22; temp. 98°. Severe abdominal pain. Surface pale and extremities cool. An hour later he vomited contents of stomach. Five hours later he was still pale but warm; had severe pain. Pulse 92; resp. 35; temp. 98°. Hepatic dulness diminished but not absent, abdomen not swollen, tender about bullet; left

lumbar region resonant, right dull—dullness differs on turning to the left side (bloody fluid in cavity). After consultation with Drs. Peters, Weir, and T. B. Hunter, the bullet was removed by a three inch incision and the finger passed into the cavity. Considerable bloody serum and gas followed its withdrawal, the latter thought by some to be of fecal odor. No feces. The abdomen was then opened in the middle line from three inches below the sternum to two inches above the pubes —eleven inches. One or two pints of bloody serum and clots were opened out. Four perforations, two of the jejunum, two of the transverse colon, were sutured with Lembert's suture; the stomach, liver, and spleen inspected, and the intestines and cavity thoroughly washed with carbolic acid (1 to 100). The posterior wound was covered with iodoform compress. In holding the small intestine out of the wound a vein in the gastro-ophemic omentum was torn, but vainly secured with ligature. The point of entrance of the bullet was not detected. The tissues of the ascending mesocolon were stained black with extravasated fluid. The operation lasted one and three-quarter hours. At its close the pulse was 125 (small), resp. 42. Reaction was imperfect and death ensued at the end of eight hours. The autopsy made by the deputy coroner did not disclose the point of entrance into the abdominal cavity. In the retro-peritoneal tissues about the kidney and ascending colon was extensive extravasation of blood. Kidney uninjured, stone, bloody serum in the cavity. The wounds were tightly closed and no others were found.

Comment on these cases is unnecessary, but it is worth noting that none of them presented positive symptoms of injury of the intestine, and that all were submitted to operation on the strength of the preliminary exploration of the bullet wound. The unsuccessful cases undoubtedly died from the shock of operation, but the lesions found demonstrated clearly the necessity of interference.

The following are the fatal cases in which no operation was done:

Case 4. An Italian woman, twenty-three years of age, was shot with a "22" pistol, September 23, 1884, the bullet entering the abdominal wall in the middle line half way between umbilicus and pubes. No shock and no abdominal pain. A ocal peritonitis developed gradually; an abscess burst through the wound, which discharged feces on the twenty-second day. On the twenty-third day a hemorrhage of a few ounces from the wound brought about her death in collapse. The autopsy showed general peritonitis and an abscess encapsulated by adherent intestines and communicating with the wound. In the wall of this abscess was the epigastric artery (ulcerated), and connecting with the cavity were two ulcerated openings in the sigmoid flexure —the original bullet wounds. The bullet was embedded in the muscles near the crest of the ilium. There were no other intestinal wounds.

This woman died three weeks before McElroy (the first patient operated) was brought to the hospital. I had looked on this case as one likely to recover. The autopsy showed so little damage to the gut that I was led to look carefully into the histories of the other cases. The result of this investigation, together with a knowledge of the success obtained in pathological cases, led me to decide to give the next case that presented,

the chance of operation. But another fatal case presents intestinal lesions quite as trifling as the last.

Case 5. On November 2, 1886, a French cook was brought to the hospital four hours after being shot with a 32 pistol. There was a superficial wound of the chest, and another entering the body in the eleventh intercostal space three inches to the left of the spine, and passing forward. Anteriorly the bullet could be felt beneath the skin in the left mammary line close to the cartilages. Abdominal pain; trifling shock. Abdomen normal except for tenderness about bullet. Pulse 100; resp. 36; temp. 99.5°. Two hours later the bullet was removed, the wound sutured over a rubber drain. Twenty-four hours later there were vomiting, tympanites, and general prostration. In the next forty-eight hours the symptoms were aggravated. At the end of the third day the wound was enlarged so as to admit the finger, on withdrawing which fluid feces escaped. The general condition did not admit of further interference than free incision of the parietes in the track of the wound; but this was sufficient to let out a quantity of fecal matter, and to reveal an opening in the posterior wall of the descending colon. Death ensued on the fourth day. The autopsy disclosed a general purulent peritonitis, feces being found in the exudation, and the intestines matted together. The omentum was firmly adherent to the transverse and descending colon. The bullet had passed through the wall of the descending colon both posteriorly, where it was uncovered by peritoneum, and again anteriorly close to the point of reflexion of the peritoneum to the lateral abdominal wall. The two wounds were about an inch apart. There were no other intestinal wounds, and the other organs were healthy.

In this instance enlargement of the wound from which the bullet was extracted would have been sufficient to examine the colon, and to detect and suture the wounds.

The three following cases I cannot present with as full details as is desirable. But they will serve to strengthen your convictions, as they gave rise to mine, of the necessity for operation:

Case 6. A machinist, forty-nine years of age, shot himself accidentally June 24, 1878. On admission to the hospital, a few minutes later, he was in a state of profound shock. The wound was situated two inches to the left and one inch below the umbilicus. Reaction was slow and imperfect. Two hours later he vomited contents of stomach and bile. The vomiting was repeated, collapse occurred, and he died at the end of twenty-four hours. The autopsy revealed several ounces of coffee-colored fluid in the peritoneal cavity (feces not referred to). The bullet had passed through the small intestine and psoas muscle, and lodged in the abdominal wall near the crest of the ilium.

Case 7. A laborer, aged twenty-five, was shot in the abdomen. On reaching hospital he was drunk, and in good condition, but bloody urine was drawn. Within twelve hours vomiting occurred, peritonitis developed, and he died in three days. Autopsy showed "several perforations of the small intestine, and the bullet lodged in the ascending colon."

Case 8. May 4, 1879, a mechanic, thirty-seven years old, shot himself with a pistol. The bullet entered two inches to the right and one and three-fourth inches below the umbilicus, and was felt under the skin on inner side

of left thigh, and removed.   Pulse 108; resp. 25; temp. 99½°.   Bloody urine, moderate abdominal pain.   In a few hours vomiting and collapse.   Retention of urine persisted.   It was found in autopsy that the ball had made wounds of the small intestine, and passed through the bladder to the thigh.

In the light of our present knowledge, the record of these cases is a melancholy one.   None of them, with possibly the exception of the last, presented lesions so serious as those of the cases which have been operated on.   All of the patients were victims to that policy of non-interference which was born of the dread of wounds of the peritoneum.   The achievements of antiseptic surgery have dispelled that fear; and we are in duty bound to give to abdominal injuries the chances offered by an early and thorough exploration.   And, as our experience extends, there is every reason to believe that our successes will multiply.

In considering the contra-indications to laparotomy, we must remember that many wounds involve the solid viscera as well as the intestine.   This is true of those which enter the abdomen in the epigastric, or within the hypochondriac region, and pass through the stomach spleen, and liver, or, entering from behind, around the kidney.   These are very complicated injuries, and for the case of liver or spleen, and kidney to a less degree, are accompanied generally by profuse hemorrhage and consequent profound shock and depression.   I am doubtful of our ability to cope with such serious lesions in addition to those of the intestine.   Dr. Dennis has reported one case of a bullet entering the epigastrium opening through the liver, in which laparotomy was of no avail, and two similar cases in my service have been subjected to operation by Dr. Wiekin and myself.   One patient died during the operation (reported in THE MEDICAL NEWS, of November 6, 1886), the other survived but an hour.   The stomach might offer insufferable difficulties if the posterior wall were perforated, but the spleen and kidney could be dealt with more satisfactorily by extirpation.   But those manifestations make success extremely doubtful; and operation would certainly not be justifiable in a patient suffering from a serious degree of shock.   Uncomplicated intestinal wounds are not attended with profound shock, and the subsequent depression is apt to be followed by reaction.

When the solid viscera are involved, the shock will be profound, its phenomena prolonged, and reaction incomplete.   Hence I regard a prolonged condition of shock as a decided contra-indication to laparotomy.   The phenomena of this condition must be interpreted by the individual surgeon according to his own experience and judgment.   A partial or complete reaction may change his view as to the gravity of the case, and justify a disregard of this contra-indication.   But it must be remembered that the exposure and handling of the viscera are of themselves procedures compromising to the life of the patient and should not be undertaken unless there are reasonable chances of success.

A well-developed peritonitis might be regarded as a contra-indication in view of the diminished chances of successful operation from the reasons mentioned at the beginning of this paper.   I do not think we are in a position to decide upon this yet; but in view of the fact that it is no longer considered an obstacle to operations for the removal of tumors, or for intestinal obstruction,

and that it has been cured by laparotomy with irrigation and drainage, we are justified in disregarding it, unless the patient be too much depressed to warrant any operation.

In conclusion, let me make one exception to the rule of treatment I have advocated, viz., to explore the bullet wounds first.   It is in cases where the wound is situated in the posterior wall of the abdomen, or in the lateral wall covered by the lower ribs, and there is no evidence of any wound anteriorly.   Here enlargement of the wound would not permit a satisfactory inspection of the cavity, and there are many chances of the missile being looped in the thick layer of muscles, or deflected by the ribs, and I believe it would be manifestly proper to wait for symptoms before resorting to laparotomy.   But with this exception, and the contra-indication I have mentioned, I am convinced that the surest, safest, and quickest way of dealing with shot wounds of the intestine, is first to assure one's self by exploration of the wound of entrance, that the cavity has been entered, or the gut injured, and then to repair that injury by laparotomy.

DR. THEODORE R. VARICK, of Jersey City, said that:

Assuming that a diagnosis has been made that perforation of the intestines has occurred, we are brought face to face with one of the most formidable conditions a surgeon is called upon to treat.

The indications for treatment are based upon the recognition of the various factors leading to death; which are, primarily, shock and hemorrhage; and, secondarily, peritonitis, resulting from the wounds and the extravasation of intestinal contents into the peritoneal cavity, which, if life be sufficiently prolonged, terminates in sepsis.   The gravity of wounds of the kind is modified by location and size, as to whether affecting the large or small intestine, or inflicted from behind, opening the gut where it is uncovered by peritoneum, and whether it is a simple perforation, multiple, or complicated by the opening of an artery or vein.

The symptoms indicating the predominance of either one of the factors alluded to, might be construed as a guide as to the immediate or later resort to operative procedure.   In some instances the eversion of the mucous membrane, it is alleged, in cases of small wounds, may possibly for a time prevent extravasation, but later on the occurrence of sloughing at the periphery of the wound allows extravasation to occur and peritonitis to ensue.   Sloughing may occur at an early period, as in a fatal case reported by Dr. Charles A. Jersey, in which death took place on the fourth day.   The autopsy showed "the edges of the two perforating wounds in the mesentery had separated, and their surfaces were covered by a blackened, softened slough, discharging pus into the peritoneal cavity."   This eversion of the mucous membrane observed in wounds of the intestines acting as a temporary barrier, seems to me to exist more in theory than clinical observation would warrant, and should be disregarded altogether in the question of treatment, especially when we consider the difference between a clean-cut or punctured wound made with a sharp instrument, and one inflicted by a bullet.   In the one there is no loss of substance, but a simple solution of continuity; in the other there is not only a solution of continuity, a frequent actual loss of substance, but the tissues are torn, frayed out, and the vitality of the sur-

rounding tissue destroyed, the part being apparently punched out; while the contraction of the muscular fibres tends more and more to keep open and enlarge the wound, offering increasing facilities for the extravasation of the intestinal contents.

No matter how small the perforation may be, there is almost always a corresponding amount of extravasation. It is barely possible that peritonitis, provided the opening be small, and the extravasation be limited and gradual, may, as in non-traumatic cases, cause a sufficient amount of adhesions to circumscribe the effused matter, and terminate in abscess. This is so very improbable as to merit little consideration.

The exceedingly small percentage of recoveries after gunshot wounds of the intestines, raises the question, not so much as to the necessity of an operation, as it does regarding the time when laparotomy should be performed.

The contraindications are only such as would foreshadow the rapid approach of dissolution, when the operation would be absolutely useless. Shock, to a greater or less extent, always accompanies shot-wounds of the intestines, and it is a factor which is often a source of embarrassment, governed oftentimes as much by the nervous susceptibility of the patient, as it is by the gravity of the wound. Viewed in the abstract, it is exceedingly fallacious, but taken in connection with gradually increasing evidence of exhaustion, such as rigidity and feebleness of the pulse, jactitation, sighing, respiration, and sinking of the temperature, indicating intra-abdominal hemorrhage, and in cases in which, in addition, is found dulness at the more depending portions of the abdomen, with tympanitic distention of the anterior portion, immediate laparotomy is clearly indicated, that the bleeding vessels may be tied, and the extravasations removed.

In this connection I desire to call attention to the significance of tympanitic resonance over the liver, and also to the persistence of hepatic dulness, first brought to the notice of the profession by one whose memory is dear to every one of us, the lamented and illustrious Flint: "Tympanitic resonance over the liver, however, cannot be considered a proof of the presence of gas in the peritoneal cavity, inasmuch as the resonance is found not infrequently when the transverse colon is much distended with gas, or when this portion of the intestine is pushed upward above the lower margin of the liver; but persistent hepatic flatness is proof almost absolute against perforation."

The first condition, taken in connection with other corroborative symptoms, would, as before remarked, call for prompt action, while the latter, although not an absolutely certain contra-indication, might justify delay. It should be borne in mind that the condition of fulness or emptiness of the stomach and bowels, or, in other words, whether the injury is received shortly after a meal or fasting, are important factors governing the amount of extravasation from the wound.

The character of the vulnerating body enters into the estimation of the gravity of the wound; thus a charge of shot produces a more ragged and extensive injury than one inflicted by a single bullet; and the frequent lodgement of pieces of clothing and other foreign substances within the abdomen, adds to dangers of irritation and sepis, and demand immediate removal. The longer

these substances are allowed to remain, the less chance there is of ultimate recovery.

To the genius of Ephraim McDowell are we indebted for the demonstration of the practicability of intra-abdominal operations, and this demonstration has given rise to the brilliant results obtained by a host of surgeons eminent in the domain of gynecology, until laparotomy has become firmly established as a justifiable, and, in many instances, an operation imperatively demanded. If it is demanded in the various phases of ovarian and uterine disease in which a fatal result may seem far distant in the future, how much the more necessary is it in cases which, if active measures are not at once resorted to, a fatal result ensues, not in days or weeks, but in hours, or, perchance, in minutes?

If the operation is considered a desperate one, we should bear in mind that we have a desperate case to treat. The day of expectancy is past, and the time for bold and decisive action has arrived. Would not a surgeon be worse than criminal, to allow a patient whose life-blood is oozing away, whose peritoneal cavity is subjected to the contact of feculent matter, or, perchance, foreign substances from without, lighting up peritonitis and sepsis, leading to inevitable death, to die, when, in the light of surgical science of the present day, means are offered to stem the outflow of life, to remove by thorough cleansing of the peritoneal cavity all foreign substances, and, by the various methods of continuous suture, close the door to further extravasation, and allow a conservative plastic exudation to complete what art commenced.

Who would not at once remove a foreign body from an extremity the effect of which would be simply the production of a limited amount of inflammation and suppuration? And how much more is it the duty of the surgeon to remove from the abdominal cavity more deadly material, whose presence, moment by moment, tends more and more to shorten life? If time enough has already elapsed to note a gradual descent of temperature, it indicates a continuous hemorrhage.

Operate at once and arrest the hemorrhage. If the temperature has ceased to fall and has begun to rise above the normal, inflammatory consequences are already initiated, but, possibly, it may not yet be too late to operate. At all events, give your patient the benefit of a chance, no matter how small, as against an almost absolute certainty of death.

DR. CHARLES B. NANCREDE, of Philadelphia, remarked that out of a number of cases to which he had referred, and to those cases with which he had been brought in contact, he had found that about eight per cent. recovered, which he thought taught us the necessity for laparotomy.

What is the danger of laparotomy and what are the advantages derived from it? First, the tendency is toward death. One surgeon reports that he has met with four cases in his own practice, where the gut was unwounded, by the showing of the post-mortem. The passage of the ball, whether obliquely or straight, and the shape of the ball and its calibre have all to be considered in these cases. In one case the point of entrance was so tightly closed that it would hardly open on manipulation, and yet frequently the abdominal wound allows fluid to pass out to the external surface.

What are the causes of death? In nearly every case,

septic peritonitis caused by feces or pieces of cloth. About ninety per cent. die within forty-eight hours where there is extravasation of feces; hemorrhage in itself is rarely the cause of death where an operation can be contemplated. Septic intoxication is also a cause of death. Dr. Nancrede here called attention to the question whether this was not more frequently the cause of death than sepsis.

When recovery ensues, what conservative process takes place? This occurs in eight per cent., but this is not exact, for probably adhesions form more often. Again, a small primary fecal extravasation may occur, giving rise to an abscess, which, if it bursts internally, results in death. In gunshot wounds of the intestines, shock is all we need dread; we can almost certainly prevent septic infection; should peritonitis set in we can secure drainage. We can restore continuity of the gut, we avoid the risk of fecal fistula, and we secure the arrest of hemorrhage.

Always operate in shot wounds of the intestines, except when certain contraindications exist; but still there is always room for mistakes, and no wound of the bowel may exist. In a penetrating wound of the abdomen and probable wound of the intestines, laparotomy is the proper procedure; tympanites in such cases demands an operation; exit of blood, feces, etc., from the wound demands operative interference, and should be resorted to as soon as the patient is in a condition to operate upon.

Dr. Nancrede considered that the surroundings of the patient should not contraindicate an operation, but still every surgeon should not operate, and during the operation only one pair of hands should enter the abdominal cavity. Inexperience of the surgeon is a contraindication, and most cases will do better if left alone than if operated upon by a poor surgeon. He could not advocate laparotomy in those cases in which peritonitis exists; injury of other organs may also contraindicate it; one must remember that the opening of a tense abdominal wall, and removing portions of intestine, is a different matter from that of removing an abdominal tumor where no peritonitis or previous shock exists.

DR. JOHN B. HAMILTON, of Washington, discussed the following question, *What are the essential features of the technique of laparotomy, including the management of the wounded intestine?*

He remarked that his experience in relation to this subject had not been large, and he was unable to mention more than one successful case occurring in his own practice, which had been previously reported in the medical journals. He did not think there were any positive diagnostic signs of intestinal injury in gunshot wounds, in the very early stages. In support of this he quoted a case of a woman twenty-two years of age who was admitted to the hospital just after she had been shot in the abdomen. The surgeon there at the time could find no shock or pain, but simply a small abdominal wound where the ball entered; he allowed her to remain over until the next day. Dr. Hamilton then coming on duty, took charge of the case. Tympanites was then developing and there were signs of intestinal involvement, but he was unwilling to perform laparotomy so long after the injury, and under the condition the patient was in. She had no pain, but tympanites was in-

creasing. Death occurred on the third day after the injury. At the autopsy four perforations of the intestine were found. The abdominal wound was very small a little below and to the left of the umbilicus, at the edge of the rectus muscle. He thought the case sufficient to prove that the intestines may receive serious injury and yet give no signs of it, as up to the time of her death there had been no shock or pain at any time.

What shall be the method of treatment?

In Dr. Hamilton's opinion the first question is to consider whether the intestines are injured. At the rate of percentage death nearly always followed, especially when the wound was inflicted at short range. We first wish to know whether the abdominal cavity has been entered, and for this purpose he advised the use of the probe, although he knew it was against some of the most ancient customs of surgery; but no one has yet pointed out the evil of using the probe, and the objection to it rests only upon tradition. In advocating the use of the probe as a means of diagnosis, he wished to be understood that its use should be restricted to cases of small pistol-shot wounds, using a soft flexible probe which could do no harm. The only danger in the use of the probe, he thinks, was in passing too small a one.

The indications for laparotomy are clear and distinct in these conditions; if there is shock an exploratory laparotomy would be indicated.

Under what circumstances, and how soon after injury should laparotomy be resorted to, and when is it contraindicated?

He thinks it should be resorted to whenever the surgeon believes the intestine has been perforated. He also drew attention to the advisability of an early operation, as illustrated by the following case. A patient was brought to him three hours after a shot wound of the intestines; laparotomy was performed. At the point of injury there was considerable hyperæmic redness, but the rest of the intestines retained their pearly color and were not congested throughout until the close of the operation. This is an important guide in searching for the injured parts, for had a few more hours elapsed the intestines would have been inflamed all over and the difficulty of finding the wounds much greater.

He thought the operation was contraindicated after the lapse of forty-eight hours after the injury, where the patient is in a state of collapse, and peritonitis present.

As to the essential features of the technique of the laparotomy, Dr. Hamilton does not think they differ from any other laparotomy, except as to the management of the intestines; of course, the usual antiseptic precautions are to be taken, and hot towels placed over the chest, stomach, and intestines. On opening the abdominal cavity, first look for bleeding vessels, carefully examining the omentum, and tying all bleeding points, attending to the slightest abrasion of the mesentery with great care. The intestines should be drawn out, loop by loop, with the finger; the use of instruments for this purpose is not as good as the finger. As the intestines are drawn out, he lays them on a hot towel, covered with another one wrung out in hot water. When the wounds are found, stitch them up as fast as possible, but be careful not to wound the mucous membrane; he prefers to use Lembert's sutures for this purpose, using catgut of small size, cut short; the closure of the abdominal incision being effected as in other cases of laparotomy, the peritoneal

cavity, of course, having been previously thoroughly cleansed.

DR. CHARLES B. NANCREDE, of Philadelphia, then discussed the question—*What are the best methods of after-treatment in cases of gunshot wounds of the intestines upon which laparotomy has been performed?* He said the subject should be considered under three different heads: 1. When peritonitis does not exist at the time of operation; in other words, when a primary operation has been performed. 2. When incipient peritonitis does not exist at the time of operation. 3. When, despite all our efforts, or due to some neglect in technique, peritonitis develops after operation.

Of course, in all cases, antiseptic methods of dressing should be continued. Under the first conditions a recumbent position, with knees flexed, seldom changed, and then not by the patient's efforts, should be insisted upon. Alimentation should be carried on by the rectum entirely, when possible, for at least twenty-four hours, and in some cases even longer, when the stomach is irritable; at the most, cracked ice and small quantities of beef peptonoids should be given when the rectum rejects enemata, or when feeding by the mouth is begun. The higher up the canal the wounds are, the more imperative the rectal feeding becomes. At the end of a few days, full quantities of food may be given. Should tympany occur to any extent, the rectal tube and enemata should be tried; if masses of feces are suspected to be lodged in the colon, about thirty grains of inspissated ox-gall, dissolved in some mucilaginous vehicle, should form the enema, and will sometimes relieve severe tympanites when an ordinary injection will fail, owing to the occlusion of the intestinal tube by fecal plugging.

When incipient peritonitis exists at the time of operation, with the probable formation of large quantities of acrid septicæmic or sapræmic serum, precisely as in similar conditions after ovariotomy, drainage should be instituted; when possible, the tube should be of glass, and have its end kept well down between the rectum and bladder in the male, or in Douglas's cul-de-sac in the female. Presupposing that a previous careful toilet of the peritoneum has been made, the tube should be periodically emptied by a syringe with a soft rubber tube attached, the syringe aseptic, and tube corked with some iodoform cotton. Should the discharge have been or become large or purulent, careful irrigation with a weak bichloride solution, or, if this is feared, boracic acid solution should be resorted to. To favor drainage, a semi-prone position with flexed limbs, changed by the nurse from time to time, is to be advised.

The rules governing the exhibition of opium, stimulants, and the use of cold will be presently mentioned in detail, but it must be steadily borne in mind that neither much food nor alcoholic stimulants will be needed, since the patient will either die or recover before exhaustion demanding large quantities of aliment or alcohol comes on. As will presently be explained, atropia is better than alcohol for the exhaustion—*i. e.*, the shock of commencing peritonitis, or of the late stages, the depression of the nerve centres, especially those of circulation and respiration.

When peritonitis develops after the operation, our initial treatment must depend on whether it comes on gradually or suddenly. When the latter occurs, if there be any evidence of shock, as does occur at times from vasomotor paresis, shown by an apathetic, conscious condition, with extended limbs, pinched features, and a weak pulse, opium in large doses will prove fatal. Here small doses of morphia with atropia will stimulate the heart. The heart itself should be examined by auscultation, since this may demonstrate that it is really feeble while the pulse is hard and wiry. Now, under such circumstances, the pain is often severe, but large doses of opium, unless combined with atropia or digitalis, are very dangerous. I say large doses—I mean those ordinarily recommended for peritonitis in the text-books.

Later, owing to asthenia, the recumbent position, and compression of the lungs by tympanites, hypostatic pneumonia is apt to develop, and then the improperly aërated blood partially paralyzes the respiratory centres. In this condition morphia must be very carefully given, or, better, withdrawn, and always should be used in combination with atropia, ammonia, or digitalis. Stimulating hypodermatic injections and revulsives, such as dry cups to the lungs, are indicated. In case of peritonitis, which develops more gradually, as Burchard points out, the ideal condition to be obtained by opium is freedom from pain, irrespective of the quantity of opium exhibited; and when this is secured, the patient falls asleep, but can be readily aroused. It had better always be given as morphia, and hypodermatically, since opium by the mouth is not always absorbed, and may remain unchanged for days, to be suddenly taken up in fatal quantities.

In the latter stages of peritonitis, especially when the heart and lungs fail, and when gastric regurgitations and hiccough are rapidly exhausting the patient's vitality, one or more hypodermatics of atropia, either alone or in combination with morphine, digitalis, ammonia, or alcohol (Burchard), according to indication, will, at times, save an otherwise hopeless case.

Are there any means which will directly affect the vascular processes involved in a peritonitis? We undoubtedly possess two powerful ones. Free leeching done at the commencement of the attack, or when it has not progressed far, supposing the patient has not lost much blood from the accident, is of signal benefit. This I have witnessed at the bedside of patients, and also experimentally proved, as may be gathered from my *Observations on Bloodletting*, published some years since.

Cold, by means of the ice-coil to the abdomen, is a second means of controlling peritonitis. Cold applied to a peripheral sensory nerve has been shown by physiological experiment to control the afflux of blood to those parts supplied by the vasomotor nerves which inosculate with such sensory branches. In the present resistance the nerve circuit consists of the lumbar nerves supplying sensory filaments to the abdominal parietes, and the branches of the solar plexus which supply the intestines and peritoneum. Cold applied to the former nerves—*i. e.*, to the abdominal walls—will, therefore, cause contraction of the bloodvessels and intestines—it will do more, for it lowers temperature, relieves tympany, and calms the nervous system. If, by any chance, the sutures have failed and gas be in the cavity of the

peritoneum, aspiration may be tried, as suggested by Burchard, to whose admirable paper I am much indebted for useful facts and for confirmation of my own observations.

In such a case, however, I should be more inclined to reopen a portion of the laparotomy wound, introduce a drainage-tube, and freely irrigate the peritoneal cavity with an antiseptic solution. Should persistent and rising temperature, despite the ice-coil, etc., be present without the local signs of peritonitis, I should suspect the presence of some fluids, which generating ptomaines, were being absorbed and producing sapræmia—i. e., septic intoxication as contra-distinguished from septicæmia. In such an event, the reopening of one angle of the wound, free irrigation of the abdominal cavity with mercuric bichloride, and the insertion of a drainage-tube, as already indicated, would perhaps save some otherwise condemned patients. In the same way should septic peritonitis arise with probable effusion of considerable quantities of fluid, such as are often found after death, I should strongly advocate a similar plan of treatment.

Owing to the anatomical position of the kidneys they are liable to become involved when the peritoneum is inflamed, hence the use of turpentine stupes for tympanites is to be deprecated, and Burchard states that "more than one has a timely application of cups, and a digitalis poultice over the kidney saved for him the life of a patient who was insidiously developing a nephritis." Daily examination of the urine should, therefore, be made, since retention of the urinary excreta in Bright's disease is a well-known cause of peritonitis. Digitalis in some form, and perhaps other diuretics are also peculiarly indicated in the sapræmic condition, to aid in the evacuation of the poisonous ptomaines, for if none of these products are allowed to remain in the peritoneal cavity, and if those already absorbed can be eliminated, recovery will often ensue.

I can hardly conceive, as I have already said, of a case of traumatic peritonitis living sufficiently long to develop enough true exhaustion to demand large quantities of food and stimulants ; but, should this occur, of course the experiment must be tried, but the stomach will probably rebel. I am sure what would be a deficient amount of aliment for one in health had better be the rule in cases of traumatic peritonitis, all the more as they generally occur in those in robust health.

I am opposed to operating when advanced peritonitis is present. If it were possible to determine beforehand that only one perforation existed, a laparotomy might be done, and providing the injured loop of bowel could be found and secured to the abdominal wound, and free drainage instituted, good might accrue; but my experience of laparotomy for diffused peritonitis following rupture of the bowel, and for ball wounds, teaches me that it is extremely improbable that we should be able to find the wounded bowel without excessively prolonged manipulation, that if more than one perforation existed, the gut would be in no condition to suture, that multiple perforations would be so situated that all the loops of wounded intestine could not be secured in the abdominal wound ; and if not all, what good can the operation do ? and finally, that neither free drainage nor an effectual toilet of the peritoneum could be secured.

DR. CHARLES T. PARKES, of Chicago, thought that sufficient data had not yet been offered upon which to form a correct diagnosis.

First, the size of the firearm must be taken into consideration, distance, shape of the bullet and calibre : bullets of large calibre are less likely to glance; though a small bullet may often prove as serious in its result. (Dr. Parkes then showed a drawing in which the intestine had been wounded in two places; the first wound was of an oblong shape, while the last, in which the bullet was found, had shattered the gut, causing an immense opening ; the calibre of the bullet being only 22.) Then, again, the result of the injury may be affected by the obliquity with which the missile enters the body. Dr. Parkes then gave the history of a thief who was shot when running away from his pursuers. The bullet was of 44 calibre, and struck him in the back; he fell down, but jumped up and managed to escape. The next morning he went to the hospital, where it was found the ball had entered the back about four inches from the spinal column, and came out near the umbilicus. He never developed any serious symptoms, and left the hospital on the second day.

He thinks that close body shots require abdominal section ; also, that round bullets, at ordinary range, do but slight damage, but that the firearms at the present day have immense penetrating force. He considers that every surgeon, on being called to a case of gunshot wound of the abdomen, should go prepared to operate at once. If the patient be suffering from deepseated pain ; the abdomen tender on pressure, with other pathognomonic symptoms, the diagnosis may be safely made. Vomiting of blood may be considered as a positive sign of perforation of the stomach, but still there are exceptions even to this rule ; bloody stools, also, would be diagnostic, but these are seldom present in the early stages; ordinary tympanites is of slow development. In two cases he had seen, deep-seated emphysematous crackling occurred; severe injuries to the deep-seated vessels are more liable to bring about shock. He considered that laparotomy adds but little to the danger to life when perforation be present.

As to treatment of intestinal wounds, Dr. Parkes remarked that he would say practically the same as had Dr. Bull. First, diagnosticate positively the presence or absence of perforation; if not satisfied, enlarge the wound and follow it up. It does not necessarily follow that fecal matter should cause peritonitis, or that fecal gas alone will produce it, but fecal extravasation is sure to have this result. Always operate on the spot, if possible, and enjoin absolute rest. Should your patient have to be moved, be careful about avoiding shock.

How soon after the perforation of the intestine should laparotomy be performed ?

Just as soon as the patient will allow it and the surgeon can prepare himself for the operation. But there are some cases in which it is contra-indicated. As a last resort it should be performed in all cases. An obviously fatal result is a contra-indication, but who is able to assert positively the presence of such conditions; therefore, it may be said that there are no contra-indications to the performance of laparotomy, and any one who has had experience in abdominal surgery meets with great and pleasant surprises in these cases.

What are essential features as to the management ?

No surgeon can fail to be convinced that a line through

the linea alba is the only line of incision; this is the same in operations upon the cadaver. The speaker had seen two cases in which the abdominal incision was lateral: the post-mortem of the first one showed fecal matter and blood, which had not been discovered by the operator. In the second case the man was sinking from hemorrhage, the bleeding vessel could not be found, but was traced to the other side of the body, but could not be uncovered, and the patient died.

After the primary incision secure all bleeding vessels, and if necessary, draw out the intestines, passing the whole carefully through the fingers while searching for the wound, keeping them covered with hot cloths. In closing the wound turn the edges in and use Lembert's intestinal stitch, taking up as much tissue as you possibly can. He considered a double row of sutures unnecessary, as being liable to increase shock; the best needle to use being a small round one, putting in the stitches about an inch apart; take up more than the peritoneum, but do not go through into the mucous coat.

Swift bullets make a clean cut; those of diminished velocity do more damage. The large majority of wounds can be treated successfully in the first class of cases. In the latter, resection may be required, the fingers of an assistant being the best clamps in such cases. In some cases the continuous suture may be used, but if there is much oozing, provide drainage; close the wound in the ordinary way, but look out for hernia. Great care should be used in fastening all the wounds, do not make them too tight or sloughing will result; if the peritoneal surfaces are held together for a few hours they will firmly adhere together. It is a fact to be remembered, that the circulation of the tube is not sufficient if the mesentery be destroyed; therefore, care should be taken always to restore the mesentery.

The after-treatment is to be carried out on general principles; the use of opiates, etc.; if the temperature rise, the application of cold externally, but if it does not go over 101°, the patient should be let alone.

MONTREAL MEDICO-CHIRURGICAL SOCIETY.

Stated Meeting, November 5, 1886.

THE PRESIDENT, JAMES C. CAMERON, M.D.,
IN THE CHAIR.

MASTOID DISEASE RESULTING IN ABSCESS OF THE BRAIN.

DR. PROUDFOOT reported a case of abscess of the brain, dependent on mastoid disease. The patient, a girl, aged twenty, was admitted into the Western Hospital under his care, suffering from a discharge of pus from the left ear. She had for years suffered at times from a purulent discharge from the ear, which had followed an attack of measles. Of late the discharge has been more profuse, and a few days before her entrance into the hospital she had had vomiting. On admission her temperature was 100° F., and pulse 65. There was no swelling or tenderness about the mastoid, but she had a purulent discharge from the ear, severe pain in the head, and occasional attacks of vomiting. On examination a polypus was discovered in the meatus and removed, after this the vomiting ceased. The pain, however, continued, and the dis-

charge remained profuse. On consultation it was decided to trephine the mastoid, but when he came a few hours afterward to perform the operation, he found that the girl had died suddenly a half hour previously. A post-mortem examination revealed a large abscess in the middle lobe of the brain, which had burst through the base and compressed the medulla.

REMOVAL OF UTERINE APPENDAGES.

DR. KENNEDY showed the uterine appendages which he had removed from a young married woman, who has the following history: After her first pregnancy she contracted an attack of gonorrhœa from her husband, and this was followed by pelvic troubles, she had incessant pelvic and abdominal pain, which increased exceedingly during each menstrual period, and during intercourse; her life became a burden to her, and she requested that something might be done, and Dr. Kennedy resolved to perform Tait's operation. The operation presented no peculiar features, and the patient made a good recovery. On examining the removed structures the tubes were found to be distended with a serous fluid, and there was complete occlusion of the fimbriated extremity. No pus was found.

DR. T. JOHNSON-ALLOWAY asked if anything could be made out by vaginal examination previous to operation. From the appearance of the removed structures he thought the pathological changes were not such as demanded operation, and that the condition could not have been determined by vaginal examination.

DR. GARDNER remarked that he thought the operation of removal of the appendages a perfectly justifiable one; he had performed it with success. The good effects following the operation were not always immediate. In some cases he had found that the pernicious neurotic habit previously acquired was often not got rid of for many months after the performance of the operation; indeed, it might almost be said to be the rule that improvement does not appear for some time, often a year or more. The operation was more suitable in women who had to earn their living, and could not be nursed for months at a time.

NEW YORK COUNTY MEDICAL ASSOCIATION.

Stated Meeting, November 15, 1886.

THE PRESIDENT, CHARLES A. LEALE, M.D.,
IN THE CHAIR.

DR. T. GAILLARD THOMAS read a paper on

LAPAROTOMY AS A DIAGNOSTIC RESOURCE,

which will appear in full in an early issue of THE MEDICAL NEWS.

DR. JOSEPH D. BRYANT said that the question of exploratory laparotomy was, to his mind, the most important one at the present time connected with the subject of abdominal surgery. The distinction should invariably be borne in mind between exploratory laparotomy and what he termed laparotomy in its entirety. He believed that exploratory laparotomy is justifiable in all cases where the diagnosis is doubtful, but with this reservation: that the means should always be at hand for performing the operation in a proper manner as regards antiseptic precautions, hygienic sur-

roundings, etc. Unless the operation is surrounded with proper safeguards, there is danger that discredit will be thrown upon it, and that it will be relegated to the obscure position which it occupied a few years ago.

During the late war gunshot wounds of the abdomen, under the expectant plan of treatment, showed, notwithstanding the many discouraging circumstances which attended them, a percentage of from five to seven recoveries. To-day in laparotomy performed in its entirety (which includes a thorough examination of the abdominal cavity and its contents, the suturing of the wounded intestines, the thorough cleansing of the cavity, and the closure of the wound), there was found to be a percentage of recoveries of no less than sixteen, a gain of more than half. These figures include not only the reported cases, but a considerable number which have come to his personal knowledge, but which have never been regularly recorded. In the cases actually reported, there were nearly twenty-five per cent. of recoveries.

Dr. Janeway said that the part of the paper which particularly interested him was that which referred to certain diseases of the abdominal cavity. The question of laparotomy in medical cases was all the time coming more and more prominently before the profession. In peritonitis, however, the conditions are usually so unfavorable that it was improbable that the exploratory operation would be attended with very brilliant results. He said he became so impressed with the unfortunate results attending purely medical treatment in many cases of peritonitis, that in a case last spring he resolved to give the patient the benefit of the best surgical advice, and called Drs. Bryant and W. T. Bull in consultation. It was one in which there was no hope of recovery whatever unless from operative procedure; and as this offered a possible chance (though the prospect was not by any means encouraging), it was resolved to perform laparotomy. This was accordingly done, but the patient unfortunately lived only twelve hours afterward, the autopsy showing a perforation of the vermiform appendix. Still, he believed that the operation was justifiable, and he should recommend the same again in any case in which the diagnosis could be made sufficiently early.

There is always more or less uncertainty, however, about the diagnosis in such cases, as was well illustrated in the case of a physician which had come to his notice. This gentleman had already had two attacks of what was apparently well-marked perityphlitis, when there were great pain and tenderness in the right iliac fossa, accompanied by a temperature of 104° lasting for a week or ten days. Last week he had another such attack, while in Boston, and laparotomy was then performed there by Dr. Marcy. Curiously enough, however, the exploration of the abdominal cavity revealed the fact that there was no assignable cause to be found for the trouble, though all the special symptoms regarded as typical of perityphlitis were present. Fortunately the case terminated favorably, and now, at the end of five days after the operation, the patient was doing well.

In many cases of perforation of the intestines in typhoid fever he said he would be inclined to recommend the trial of laparotomy, if the condition were recognized, especially by the presence of liver reson-

ance, sufficiently early; and one case of this kind with a favorable result has already been reported in Germany.

Dr. Ira B. Read presented specimens from a case of

RUPTURE OF AN ANEURISM OF THE THORACIC AORTA,

as a sequel to a paper read before the Association several months ago. The case then reported was one of double popliteal aneurism where both femoral arteries were successfully ligated, the one in June, 1882, and the other in February, 1883. It was consequently more than three and a half years since the last operation, and more than four years since the first. The patient, while pursuing his usual avocations, died suddenly on the afternoon of October 29th, and at the autopsy made on the morning of the 30th, the pericardium was found filled with blood. On opening it the heart was found to be completely embedded in a large clot of blood, and further search showed that there was a rupture of the ascending portion of the aorta, the orifice in the sac easily admitting the finger. There was, however, but little dilatation observed, and other parts of the aorta showed marked atheromatous degeneration, so that rupture would soon have occurred in some of these had not the point of rupture described proved the earliest.

Dr. Read also exhibited a section of the femoral artery above and below the point of ligation. Below, the artery was occluded by what seemed to be an organized fibrous growth, while above there was the ordinary appearance of the normal artery. Unfortunately, he said, he was never able to examine the patient for abnormal heart-sounds or aneurismal bruits since the last operation; but at that time there were no physical signs of aortic aneurism.

He had not been able to find any probable cause for the arterial condition which existed in this case. The patient being a man of thirty, apparently in full vigor, with no history of syphilis, either present or remote, and not intemperate, he could only accept the fact that there was an atheromatous condition of the arteries which predisposed to aneurism, and finally led to his death. The heart was normal in size, and the lungs and liver healthy in appearance, but the spleen and kidneys were very much enlarged.

Dr. Janeway presented a specimen of

PERFORATION OF THE INTESTINE IN A CASE OF
TYPHOID FEVER.

Peritonitis was present for two and a half days before death, but the usual flatness of the liver on percussion was not replaced by resonance sufficiently early to permit of any possible hope from a resort to exploratory laparotomy. The gas in such cases sometimes escaped very slowly, and the difficulty in regard to the operation was, that unless the liver flatness was lost, and there was severe pain, we could not feel assured that peritonitis was present. Indeed, in all cases there was some degree of uncertainty, since cases of supposed perforation and peritonitis had been known to recover. In reality, however, they were cases of enteritis or of gastritis. Such cases, therefore, should make us hesitate to perform laparotomy, unless the diagnosis were very clear.

NEWS ITEMS.

THE POPE'S MODEL CHOLERA HOSPITAL IN ROME.— A correspondent of the *Globe* gives an interesting account of the "model cholera hospital" which the Pope has caused to be erected in Rome for the accommodation of cholera patients in case of an epidemic. Contact with the outer world is carefully guarded against by grated windows, telephones, and by a revolving barrel with half its circumference open, by which provisions are taken into the hospital. The water-supply is drawn from a well, and is quite separate from the city supply. The drain is formed of an iron tube sixteen inches in diameter, the joints being hermetically sealed with lead. There is a disinfecting boiler in which corrosive sublimate is placed. There is a room called the "chamber of observation," which has a staircase leading up to the first floor. In this room dead bodies are placed for a given time, as it is well known that cholera patients often show signs of being quite dead when really only apparently so. The room is, by means of an electric apparatus, in communication with the director's office. The body being laid on a bed, both hands are put into a sort of copper muff; between the hands is put an instrument so sensitive that, should there be the slightest movement of the hands or any other part of the body, this instrument would instantly close the electric circuit, and the bell in the director's office would be set ringing; at the same moment another instrument registers the number corresponding to the bed upon which the body is lying. The chamber is warmed by steam so as to facilitate resuscitation. The laboratory is provided with a gasometer for the storage of oxygen, which is taken to the wards for administration in gas-bags. On the ground floor are four wards for doubtful cases; should they get worse, they are sent up in the lift to the cholera wards above, their clothes and bed-linen being immediately burned. Another room is set apart for women in childbirth, and there are two more for undressing patients, so that the infected clothes may be destroyed, the Pope furnishing new clothing for all recovered cases. The cubic space allowed for each bed is thirty-six cubic metres. The ventilation is carried on by means of funnels with gas jets below. The chapel is in communication with the sacristy of St. Peter's, so as to form an easy access for the Pope should he wish to visit the hospital; but before returning into the sacristy his Holiness and suite would have to go into a room near it for disinfection. In the event of there being more cases than the hospital can hold, provision has been made for building large sheds in the garden. This hospital was begun in October, 1884, and finished in April, 1885. When the cholera was raging with such violence in Naples, Leo XIII. determined upon making preparations should the scourge visit Rome. It has never been necessary to use it, but it is always ready in the event of an outbreak, and would prove of much use in extirpating it.

CREMATION IN AUSTRALIA.—The legislature of New South Wales has passed an act which legalizes cremation in that colony. Crematoria are to be established. The plans must pass the Board of Health, and every applicant for a license must satisfy the governor that he is the owner in fee simple, and has general consent to allow of cremation upon the land.

ERRORS IN DELICATE WEIGHING. — M. Hennig, of Würtzburg, having noticed some incomprehensible differences in the weights of equivalent quantities, undertook some minute investigations, which showed that balances of precision are often influenced by the electric state of the glass cage which surrounds them. This electricity influences the small auxiliary slides which are placed upon the beam of the balance in order to make it more sensitive. The error resulting from this influence may amount to 600 milligrammes when the cage is strongly charged, and two hours afterward there may still be an error of ten milligrammes.

OFFICIAL LIST OF CHANGES IN THE STATIONS AND DUTIES OF OFFICERS SERVING IN THE MEDICAL DEPARTMENT, U. S. ARMY, FROM NOVEMBER 16 TO NOVEMBER 20, 1886.

GREENLEAF, C. R., *Major and Surgeon.*—Relieved from duty at Columbus Barracks, Ohio, and ordered for duty as attending surgeon at Headquarters of the Division of the Missouri and Examiner of Recruits at Chicago, Ills.—*S. O. 268, A. G. O.*, November 17, 1886.

TILTON, HENRY R., *Major and Surgeon.*—Relieved from the duties of attending surgeon at the Headquarters of the Division of the Pacific and the Department of California.—*S. O. 96, Division of the Pacific,* November 9, 1886.

WATERS, W. E., *Major and Surgeon.*—Ordered from Fort Spokane to Vancouver Barracks, W. T., for duty at that post.— *S. O. 197, Department of Colorado,* November 8, 1886.

Par. 8, S. O. 257, A. G. O., November 4, 1886, is so amended as to direct Major V. B. HUBBARD, Surgeon, to report in person to the commanding officer of Columbus Barracks, Ohio, for duty. —*Par. 3, S. O. 268, A. G. O.,* November 17, 1886.

CALDWELL, D. G., *Major and Surgeon.*— Granted leave of absence for one month, with permission to apply for twenty days extension.—*S. O. 150, Department of the Platte,* November 12, 1886.

APPOINTMENTS.

MOORE, JOHN, *Lieutenant-Colonel and Assistant Medical Purveyor.*—To be Surgeon-General of the Army, November 18, 1886.

BALL, ROBERT R.—To be Assistant Surgeon with the rank of First Lieutenant, November 19, 1886.

PROMOTIONS.

BAILY, JOSEPH C., *Major and Surgeon.*—To be Assistant Medical Purveyor with the rank of Lieutenant-Colonel, November 18, 1886.

HEIZMANN, CHARLES L., *Captain and Assistant Surgeon.*— To be Surgeon with the rank of Major, November 18, 1886.

OFFICIAL LIST OF CHANGES IN THE MEDICAL CORPS OF THE U. S. NAVY FOR THE WEEK ENDING NOVEMBER 20, 1886.

NASH, FRANCIS S., *Passed Assistant Surgeon U. S. N.*— Ordered to special duty Smithsonian Institution, November 26, 1886.

RHOADES, A. C., *Medical Inspector U. S. N.*—Ordered to special duty attending officers and families New York City.

THE MEDICAL NEWS *will be pleased to receive early intelligence of local events of general medical interest, or of matters which it is desirable to bring to the notice of the profession.*

Local papers containing reports or news items should be marked.

Letters, whether written for publication or private information, must be authenticated by the names and addresses of their writers— of course not necessarily for publication.

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